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TENNESSEE CHILD PASSENGER SAFETY PROGRAM

COMPLETED

Philpot, Perry, Hughes, Wyrick,
Culler, Lo, Trent, Geiss

ORIGINAL

Transportation Center
The University of Tennessee
Knoxville, Tennessee 37916

Contract No. DOT HS-7-01730
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16. Abstract

The Tennessee law providing for the protection of child passengers less than four years of age has been in effect for one year. During this same period the Child Passenger Safety Program has been providing both a public information and education campaign to supplement the law and an evaluation of the effectiveness of the promotional campaign in combination with the law.

This annual report describes the activities of the Child Passenger Safety Program during 1978. The public information and education campaign, some measures of its effectiveness, and objectives for the coming year are discussed in an overview provided in Part I; previous relevant research is discussed in Part II; Part III focuses on specific segments of the public information and education activities; Part IV covers data collection, analysis and interpretation; and Part V provides a brief summary.

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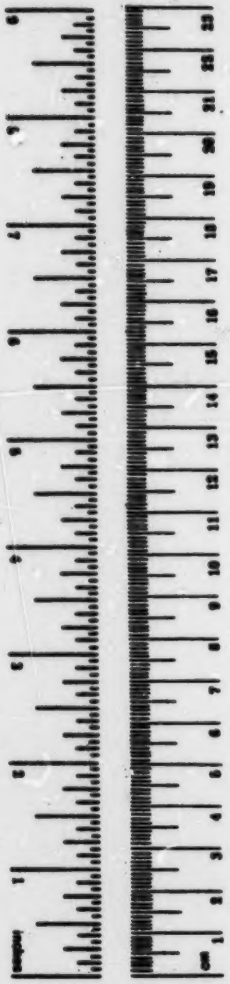
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

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The Child Passenger Safety Program would like to acknowledge several individuals who have provided special assistance in the program's activities. The Contract Technical Manager, Dr. Leigh Seaver, has provided excellent guidance as the program developed. His willingness to give time and attention to details as well as to major questions and issues is greatly appreciated.

Mr. Mike Ellis, Coordinator of the Governor's Highway Safety Program, is equally appreciated for his assistance and his patience. His knowedge of the traffic safety field has been invaluable.

Drs. Robert Sanders and Martha Bushore are recognized for their invaluable assistance and support in many activities. Their many contacts and experience with child restraint issues have been especially helpful. Advisory Panel members also have assisted in helping the program; their role has been an important one. Several individuals in other states also have been extremely helpful in providing the benefit of their own experiences and findings in the area of child passenger safety.

Finally, this report is dedicated to Dr. Ken Heathington, who initiated the CPS Program and who led it so effectively. He generated many fruitful ideas, supplied the much-needed enthusiasm and somehow got the work done. The fact that he has now taken on larger responsibilities surprises no one. The CPS Program staff are fortunate to still be able to call on his expertise.

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PART I

OVERVIEW

The State of Tennessee, by passing an active child restraint law in 1977, provided a unique research situation in the United States. Until that time, no state had any type of restraint law for any age group. The law requires that children under four years of age be protected in automobiles. The Tennessee Child Passenger Safety Program was established in September 1977 to promote the use of child restraint devices (CRDs) in Tennessee and to investigate the impact of a public information and education (PI&E) program coupled with the law. The evaluation project was designed to investigate the effect of the Child Passenger Safety (CPS) Program on highway safety in Tennessee over a two-year period after the law and PI&E activities were implemented in January 1978. This report covers activities in 1978.

The target areas chosen for this research are the five urban (see Figure I-1) and selected nonurban areas in Tennessee. Three nonurban areas, one in each of the geographical divisions of the state, were chosen to represent the "more rural" population (Figure I-2). (The term "more rural" is used because the three areas may not be considered rural by demographic standards; however, much of the population which surrounds each town for a 30-mile radius is rural.) Thus six target areas were selected--Nashville, Memphis, Knoxville, Chattanooga, Tri-Cities and the "rural" area which consists of merged data from the small cities of Dyersburg, Columbia and Morristown. The sampling and PI&E implementation plan is seen in Figure I-3.

The PI&E campaign developed by the CPS Program staff has been multifaceted and thorough. The basic state program began with the distribution of CPS brochures through hospitals, physicians' offices and public health clinics across the state. Posters also were provided for each office.

Three urban target areas, in turn, received additional promotional activities which, when combined with the brochures and posters, constituted the comprehensive PI&E plan. These additional activities include television and radio public service announcements, television and radio talk shows, newspaper articles, press conferences, public service billboard ads, audiovisual presentations and any other activities that could be stimulated among support groups in health education, highway safety, child development, prenatal care, home economics, community systems and CRD manufacturers and retailers. There were additional promotional activities of a more general nature such as magazine articles, widespread newspaper coverage and a segment on network television (Good Morning America).

The promotional materials used in the comprehensive PI&E campaigns include brochures, posters, television public service announcements, radio public service announcements, radio station mailers, public service billboard ads, desk-top billboard facsimiles, bumper stickers, CRD selection guides, CPS speaker's packets, publications, letters to various support groups, and press releases. The general tone of all the PI&E materials has been that of gentle persuasion through education rather than hard-hitting or fear-inducing approaches.

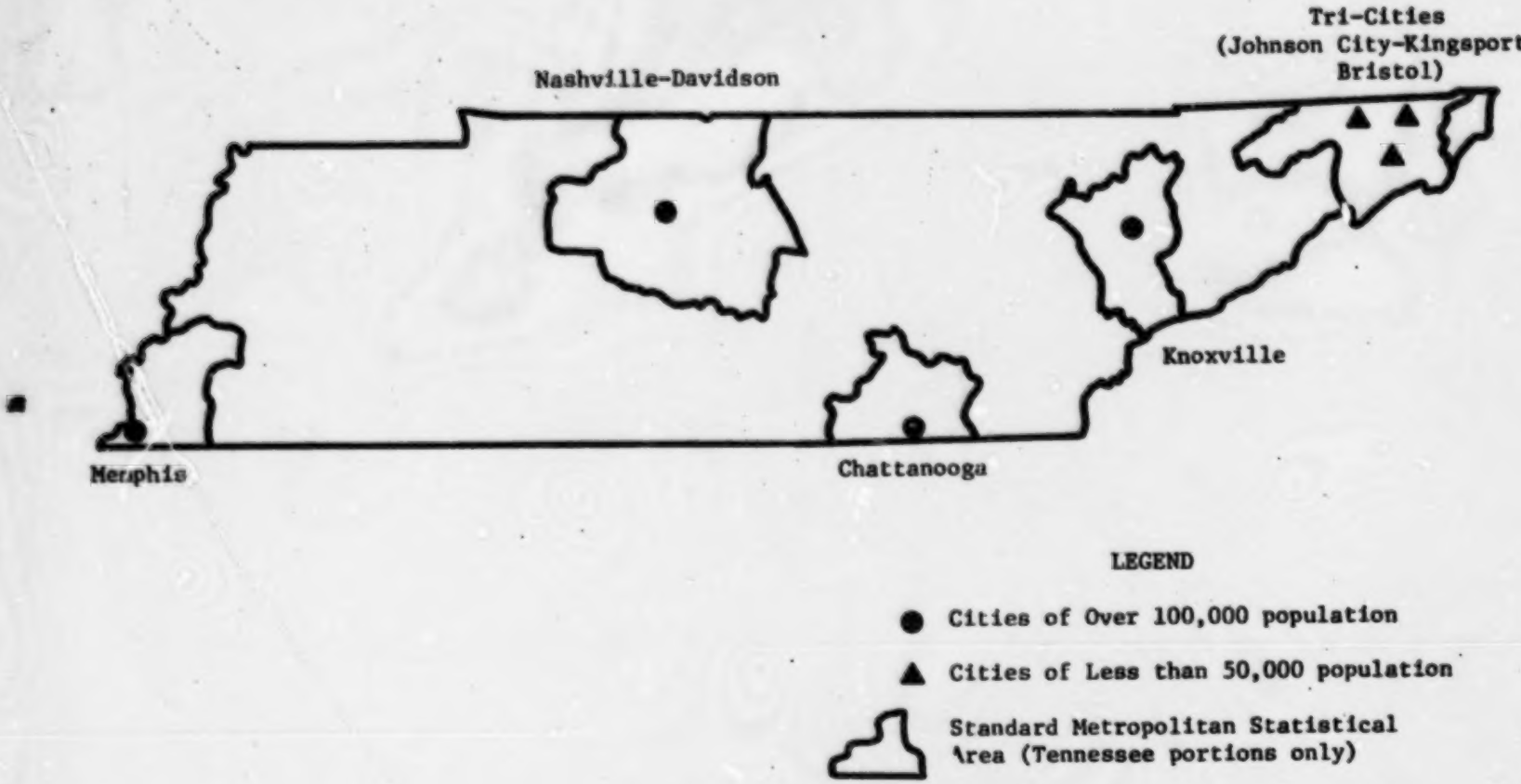

FIGURE I-1

LOCATIONS OF SELECTED SMSA AREAS

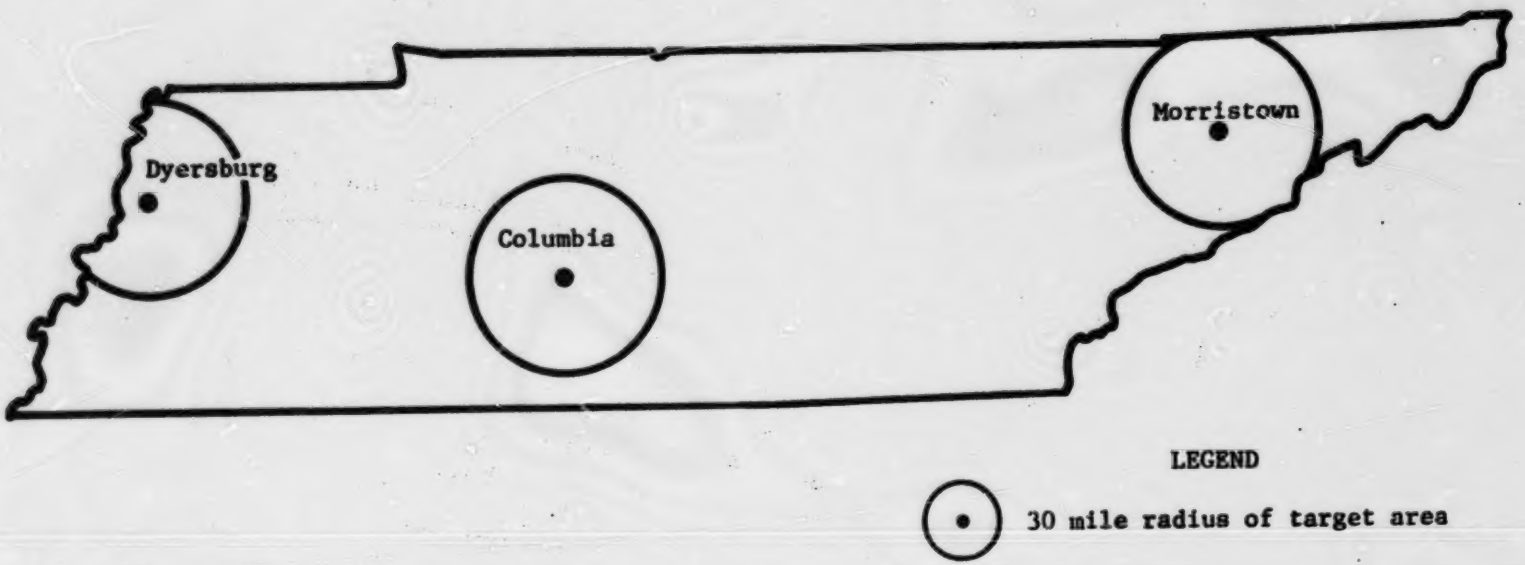

FIGURE I-2

LOCATIONS OF SELECTED NON-SMSA AREAS

TARGET	OCT 77	JAN 78	JUL 78	JAN 79	JUL 79	JAN 80	JUL 80	OCT 80
Memphis		BSP	CP+LP	CP+LP	CP+LP	CP+LP		
	BLD	SAS	SAS	SAS	SAS	SAS		
Nashville		CP	CP	CP	CP	CP		
	BLD	SAS	SAS	SAS	SAS			
Knoxville		BSP	CP	CP	CP	CP		
	BLD	SAS	SAS	SAS	SAS			
Chattanooga		BSP	BSP	CP+LP	CP+LP	CP+LP		
	BLD	SAS	SAS	SAS	SAS			
Tri-Cities		BSP	BSP	BSP	CP	CP		
	BLD	SAS	SAS	SAS	SAS			
Nonurban Dyersburg Columbia Morristown		BSP	BSP	CP	CP	CP		
	BLD	SAS	SAS	SAS	SAS			

Legend: BLD - Baseline Data
SAS - Semiannual Survey
BSP - Basic State Plan
CP - Comprehensive Plan (includes BSP)
LP - Loaner Program

FIGURE I-3

SAMPLING AND PI&E IMPLEMENTATION PLAN

To gauge the effects of these efforts, three data collections were made at six-month intervals: baseline measurements collected in late 1977 prior to the inception of the law; first operational period data collected in May/June 1978; and second operational data collected in October/November 1978.

Measures of CRD usage and related information were obtained in interviews with individuals in shopping center parking lots in each of the target areas. These results were checked against usage results obtained from a Traffic Accident Form Supplement for validity. A telephone survey was used to measure general public awareness, and fatality and injury statistics were gathered from the Tennessee Department of Safety and the Governor's Highway Safety Program.

Interview data from the first two data collection periods provided profiles of CRD users and nonusers. Users of seat belts tend to be the most consistent CRD users. Higher CRD usage rates also are observed for the higher socioeconomic status groups. Not surprisingly, those who are responsible legally for the safety of the child passenger (e.g., vehicle owners, parents) tend to have higher usage rates than others. Also, lower usage rates are observed as the number of adults in the vehicle increases, and infants tend to be placed in CRDs more often than toddlers.

The respondents to a self-report questionnaire have provided some insight into the problems associated with CRD usage. The primary reasons for nonuse indicated by the questionnaire are:

1. They are too expensive;

2. Child resists/does not like CRD; and

3. They take up too much room in the car.

The last problem may become more important as Detroit "down-sizes" its new models for fuel economy. That all three are important issues cannot be denied. While sales of CRDs are increasing, only about 50 percent of CRD owners had them in use during the first operational data collection.

Telephone surveys of awareness of the Tennessee law were taken in selected areas throughout the state. Results indicated that between 50 and 80 percent of the general adult population knew of the law, and that between 80 and 90 percent of the target population (parents of children under four) were informed. In addition, CRD sales are estimated to have increased substantially in 1978. More significantly, results obtained from accident reports indicate that those children in CRDs have a significantly lower fatality rate than the norm and nearly 50 percent fewer serious injuries.

However, expectations with respect to CRD usage were tempered by the experience with PI&E campaigns used in conjunction with seat belt laws in many other countries. These results have shown that:

1. Passage of a law is insufficient to guarantee either enforcement or compliance;

2. The effect of a PI&E campaign by itself is at best transitory and at worst nonexistant; and

3. The highest rates of compliance appear to be associated with a strong law that is enforced uniformly and is supplemented by an effective PI&E campaign.

In Tennessee, the necessary concommitant to an effective PI&E campaign, a law that is enforced systematically, is seriously lacking. For example, law enforcement officials declared the first six months of 1978 to be a "grace period" to allow parents to become familiar with the law. The last six months of 1978 saw only about 50 citations or warnings given out. In addition, the law is considered difficult if not impossible to enforce by some officers in the field. The net effect was relatively little enforcement in 1978. The law itself contains a serious flaw--the so-called "babes-in-arms" clause wherein a child legally is "protected" if riding in the arms of an older passenger.

Considering that a key element is missing from the system, CRD usage rates are surprisingly good. From a baseline usage rate of 9.2 percent for the state, CRD usage rose to 15.4 percent midway in 1978 and declined only slightly to 13.4 percent by the end of 1978. Average usage rate in 1978 was 14.4 percent. The 5.2 percentage point rise from the 9.2 base represents a 57 percent increase over baseline CRD usage.

The effectiveness of the CPS Program's PI&E is further borne out by comparison to the general pattern of effect in seat belt campaigns. In situations where no strong law enforcement existed, usage rates generally increased in the first one or two months, but by the end of eight months had returned to baseline rates. In the CPS campaign, CRD usage rates have been sustained for 12 months--and at rates significantly higher than the baseline figure. The results speak well for the persuasion through education approach to PI&E with the emotion laden issue of the safety of young children.

Realistically, however, there is cause for concern. CRD usage rates are not yet high enough to effect a measurable impact on fatalities. In the long run, usage rates can be expected to decline to baseline levels unless a definite increase in the level of enforcement of the law is brought about. In coming months, the CPS Program staff will redouble its efforts to get the law enforced to the fullest extent possible. The success of the coming law enforcement campaign is perceived as the key to the continued success of the CPS Program.

PART II

PREVIOUS RELEVANT RESEARCH

This part reviews and summarizes current literature in the topic areas of child restraint development, effectiveness of safety belts, ineffectiveness of safety belts for small children, effectiveness of child restraint devices, restraint regulations and laws and public information and education (PI&E). This last topic is given the most expansive treatment in view of the critical nature of the conclusions associated with PI&E. That is, mass media PI&E programs are generally ineffectual in changing behavior, but they can play an important role in conjunction with strictly enforced laws.

Child Restraint Development

The Bunny Bear Company in 1933 began producing a child's car seat which did very little restraining; they were designed for convenience more than safety. "Safety" was indeed a factor, but not crash safety (Robbins et al., 1970). The car seat was used in an elevated position in the vehicle providing a better vantage point for the child and resulting in less distractions for the driver.

It was not until the mid 1960s that the automobile manufacturers began to offer a safety seat for children. In 1965, the Ford Motor Company introduced the "Astro-Guard," but it was taken off the market for lack of sufficient demand (Shelness and Charles, 1975). Ford tried again in 1967 to introduce an innovative child restraint device called the "Tot-Guard" (Heap and Grenier, 1968). General Motors also introduced a seat in 1967, but this device proved inadequate and was replaced by the "Love Seat." General Motor's "Infant Carrier" has been available since 1970 (Makinen et al., 1973; Feles, 1970). These papers point out the attempts by the automotive industry to develop children safety devices. There are presently approximately 18 manufacturers of CRDs, most of which began producing child safety devices on a competitive basis during the 1960s.

Safety harnesses for children were pioneered by Rose in the early 1960s (Rose, 1965). He reported that the design took into consideration not only physics and engineering but also child physiology, parent and child psychology, and the basic philosophy of safety. The strategy of Rose's design was to allow freedom of movement while simultaneously protecting the child from the harsh interior surfaces of the passenger vehicle.

More recently Molnar has designed a booster seat to be used with standard seat belts which, by modifying the geometry of the system, appears to offer protection for children beyond the infant stage (Molnar and Rodwell, 1979).

Effectiveness of Safety Belts

As safety belts and CRDs were being developed further, there was a considerable amount of research to determine the value of restraining devices in passenger vehicles and the rates of usage of such devices. Babione (1956) made an analysis of all U.S. Navy and Marine personnel killed in car accidents between 1952 and 1954. He concluded that a large majority of the deaths would have been prevented by the use of safety belts.

A myth that occupant restraints were dangerous was a drawback to the progress of promoting vehicle passenger safety. Proponents of the myth claimed that there was great danger of being trapped inside the vehicle in case the vehicle burned or was submerged in water. Pioneer work of Tourin and Garrett along with other researchers in 1958 and 1959 provided conclusive statistical data to disprove this claim (Tourin, 1958; Garrett, 1960).

Garrett's research in 1960 indicated that safety belt users sustained approximately 35 percent fewer serious injuries than nonusers. (Garrett, 1960). From the results of their 1961 research, Huelke and Gikes estimated, that 40 percent of the occupant deaths each year in the United States from motor vehicle accidents could be prevented if safety belts were utilized. Of 28,000 accidents studied in 1967, none involved fatalities when the occupants were restrained and the vehicle speed was below 60 mph (Bohlin, 1967).

Kihlberg (1969) concluded that lap belts reduced the risk of injury in a crash by 29 percent, serious injury by 41 percent and severe injury or death by 50 percent. Levine and Campbell (1969) confirmed Kilhberg's finding, showing a reduction in severe injury and death of 43 percent when lap belts were used.

A 1974 study in Pennsylvania was the basis for the estimate of a 73 percent lower fatalities rate, a 53 percent lower serious injury rate and a 38 percent overall injury rate for all lap belt users (Usage and Effectiveness of Seat and Shoulder Belts in Rural Pennsylvania, 1976). Research in 1976 by Reinfurst et al. (1976) reveals that the chances of injury to the front seat "outboard" position occupant is reduced by 31 percent for safety belt users.

Ineffectiveness of Safety Belts for Small Children

The use of safety belts by themselves for small children have been proven to be ineffective for adequately protecting children in the event of a crash. In 1971, Australia passed legislation requiring safety belts for all vehicle occupants. A study of fatalities and injuries show a 20 percent reduction in most injury categories, but there was no significant reduction in fatalities and injuries to small children (Boughton et al., 1977). Burdi et al. (1970) document the need for small children to have special devices to be used in conjunction with the seat belt. Because the body of the small child has not developed to the point of allowing a lap belt to be positioned correctly, the belt itself possibly could cause serious internal damage by riding up on the abdomen. Snyder (1970) concluded that the forces of a vehicle crash should be distributed over as much of the body area as possible. The rear-facing reclining infant carrier is designed to distribute the forces of the crash across the infant's shoulders and back of head in the event of a frontal collision. This design satisfies Snyder's recommendations.

Aldman (1966) recommended the rear-facing infant device which has proven to be effective in Sweden. Siegel et al. (1968) studied various types of designs of CRDs. They correlated the types and frequency of injuries to children under four in vehicle crashes to the design and provided convincing arguments for the effectiveness of CRDs in reducing the severity of injuries.

Rose (1965), Aldman (1966) and Appoldt (1966) studied special needs of children for restraint devices, focusing on anatomical and psychological differences between adults and children. They concluded that all devices designed for small children should be tested dynamically to determine if they served the purpose intended.

The anatomical differences between small children and adults and older children have been studied and researched by physicians and engineers with regard to the development of an effective restraint device for infants and young children. Snyder (1970) points out that, because of these anatomical differences, the upper diagonal torso safety belt is not safe for small children. Williams and Zador (1976) report that the use of restraint devices designed for adults and older children is safer than no restraint for smaller children.

Effectiveness of Child Restraint Devices

Additional research and writing in the 1960s and 1970s were directed toward improving the effectiveness and public acceptance of restraint devices designed especially for children. Moore and Lillienfeld (1960) pointed out the need for protecting children in automobiles, suggesting that children be restrained in the rear seat of automobiles while being transported. Dye (1962), before a conference on Passenger Car Design and Highway Safety in 1962, advocated that children be secured to prevent ejection or contact with the interior surfaces of the automobile in the event of a collision.

Several studies have indicated the effectiveness of CRDs for young children when the devices are used properly. A Washington state study indicated that if all children of age five and under were restrained by CRDs at the time of a motor vehicle accident, a reduction of 91 percent in fatalities and 67 percent in disabling injuries might be expected (Scherz, 1978).

Williams and Zador (1976), in a study involving almost 27,000 passengers under age 15, found that using a back seat instead of a front seat location reduces the injury rate by 18 percent among restrained children. Further use of restraint devices reduced the injury rate by 39 percent in the front seat and 31 percent in the back. Despite these very favorable injury reduction results, they reported that over 90 percent of the children studied were unprotected by any type of restraining device.

Restraint Regulations and Laws

Consideration for regulations and laws regarding the availability of restraints in vehicles and the specifications for devices go back to 1957 when the pros and cons of seat belts were discussed and testimonies were heard before a congressional subcommittee on the crashworthiness of automobiles. The Roberts Act (Public Law 88-515) was passed to establish passenger vehicle safety standards for federal vehicles. Seventeen standards were issued by the federal government; the demonstrated effectiveness of the law stimulated the automotive industry to accept with a greater degree the responsibility of automobile safety.

The federal government took no immediate action to establish any mandatory requirements for installation of seat belts in new automobiles for the

general public. It was the State of New York that took the lead in vehicle occupant safety legislation by enacting a law in 1961 requiring the installation of lap belt anchorages in all new automobiles sold in that state (States, 1972). It was from this meager beginning that safety belt measures spread. Public acceptance of the legislation requiring provisions for safety belt usage is thought to have convinced the automotive industry to begin making safety belts standard equipment (States, 1972).

In 1963, Public Law 88-201 was passed requiring standards for seat belts for use in motor vehicles to be prescribed and published. The establishment of minimum standards for seat belts was assigned to the National Bureau of Standards. The Bureau depended upon the Society of Automotive Engineers which had begun research on seat belts in 1954 when the Motor Vehicle Seat Belt Committee was created. In 1964 the government required that all new cars have two lapbelts for the two outboard seating positions in the front seat installed as standard equipment. The National Traffic and Motor Vehicle Safety Act of 1966 mandated that lap and shoulder belts be installed for the two outboard positions in the front seat in almost all automobiles manufactured for sale in the United States after January 1, 1968. In addition, the mandate called for lap belts for all other seating positions (Robertson, 1975). Unfortunately, child restraint standards were not included as part of the 1966 Safety Act; standards for "Child Seating Systems" were developed later and became effective April 1, 1971.

Federal Motor Vehicle Safety Standard (FMVSS) No. 213 (1971) covered only the car seat type CRD while omitting the infant carrier type. The standard was revised in 1973 but was not expanded to include all forms of CRDs.

FMVSS 213, as originally written, required a "static" test which consisted of a static load being applied to the CRD with a wooden torso block inside. This test procedure essentially eliminated the "hook-over" baby seats which were on the market prior to the issuance of the standard; however, the CRDs meeting the new standards did not seem sturdy enough. In October 1971, six months following the effective date of the standard, Dr. Verne Roberts exposed the inadequacies of the test (Shelness and Charles, 1975). The Consumers Union crash tested 17 CRDs in August 1972 and found only five acceptable for protection as defined by Consumers Union. All 17 had passed the static test as set out in FMVSS 213 (Consumer Reports, 1972).

In response to the need for improvements in FMVSS 213, the National Highway Traffic Safety Administration published a proposal in March 1974 to expand the scope to cover all infant and child restraint systems, to require dynamic tests in lieu of static tests and to require anthropomorphic test dummies to be used in the simulated crash testing (FMVSS 213, Docket No. 74-9, Notice 4, 1974). Progress of this proposal was delayed until the details of the test dummy specifications and calibrations could be made. In 1978, the National Highway Traffic Safety Administration issued a modified proposal for a revised child restraint system standard and sought public comment. These deliberations have already taken over four years, and it is projected that the standard will not be effective until May 1980.

Another federal standard (FMVSS 208) passed in 1971, effective from January 1, 1972 to August 14, 1973, required manufacturers to equip new cars

with passive devices to protect occupants from serious injury in frontal crashes of vehicles with speeds up to and including 30 miles per hour or with a buzzer-light system to warn occupants that the outboard belts of the front seat were unfastened. The overwhelming majority of vehicles manufactured between January 1972 and August 1973 had the buzzer-light system instead of the passive protection devices (Robertson, 1975). Effective August 15, 1973, FMVSS 208 was amended to require an interlocking system which connected the restraint system and seat weight sensors to the ignition system. This mechanism prevented the engine from being started after a given weight in the seat was detected unless the belt was pulled from its reel (Robertson, 1975).

The first state bills proposing mandatory seat belt use were introduced in 1972 when 12 states tried and failed to pass such a measure (Pulley, 1975). In the Highway Safety Act of 1973, Congress provided for incentive payments to states which enacted mandatory seat belt legislation. Interest and enthusiasm increased in 1973 because of the authorized incentive; 26 legislatures proposed bills for mandatory seat belt use. No bill actually become law, and no state received an incentive payment. Puerto Rico, however, received almost $300,000 for enacting a law which became effective January 1, 1974 (Pulley, 1975).

Brooklyn, Ohio, a suburb of Cleveland, is the only municipality which has a seat belt use law (Pulley, 1975). The ordinance became effective in March 1966, and the mayor, serving over 25 years in that capacity, states that the law is doing what it was designed to do (Pulley, 1975).

Charles Pulley, president of the American Seat Belt Council, was part of a team which surveyed seven European countries to determine the effectiveness of mandatory seat belt use legislation. Pulley (1975) concluded that safety belt usage laws are effective in the following instances: (1) when a public education program is also implemented; (2) when a civil fine or penalty is imposed; and (3) when there is strict enforcement. He found that in Europe where the importance of seat belts had been put carefully before the public and the laws were enforced, usage is between 78 to 95 percent.

Public Information and Education

Components of a Successful Mass Media Campaign. Hyman and Sheatsley (1952) reviewed several studies on information campaigns and concluded that one cannot simply increase the flow and expect a corresponding increase in effects. To understand the psychological barriers which exist among the population, they suggest a public opinion and attitude survey to determine the elements that produce change in a particular segment of society. Mendelsohn (1973) agreed with this approach and suggested a need for a thorough analysis of appropriate targets, themes, appeals and media vehicles in order to effect any changes of consequences in attitudes and behavior.

Implications from a study to promote educational television suggested that effectiveness could be improved if the campaign was directed toward preexisting behavior patterns or attitudes and no attempt was made to change deep rooted attitudes and ego-involved behavior (Sokol, 1962). The same study further suggested that, when possible, a campaign should prevent counter-propaganda to the issue. (In a child passenger restraint program, an example of counterpropaganda would be an automobile advertisement with children riding loose in the car.)

There is further evidence that public education campaigns need to be planned carefully. Dewar's (1978) research on bicycle safety suggests that a campaign should address the most dangerous behaviors as defined by a needs assessment. The Institute for Road Safety Research in the Netherlands has studied publicity campaigns extensively and recommends a highly structured campaign plan prior to its implementation (Noordzji, et al., 1979). The following points are offered as essential in any campaign design:

1. Target groups;
2. Contents of the message;
3. Appeal of the message;
4. Source of the message;
5. Communications media; and
6. Intensity, phasing and duration.

Most researchers felt that longer campaigns would be more effective in producing changes (Rochon, 1977; Sokol, 1962). Advertisements which were shown over the longest period tended to be the most frequently recalled (Harris and Associates, Inc., 1976). Leven and Rodnight (1973) proposed that a burst pattern of advertising is more cost-effective than a continuous campaign.

Public Service Announcements. Public Service Announcements (PSAs) are usually the major components of a PI&E campaign because they are free and can be viewed or heard by a large segment of society. Many researchers have analyzed the variables regarding the effectiveness of PSAs; these studies have yielded varying results.

Fleischer (1973) conducted a tightly designed research project in which over 21,700 vehicles and 27,800 occupants were observed. One purpose of the study was to ascertain the effectiveness of communicating safety messages. The results showed that media campaigns conducted by PSAs cannot be considered a markedly effective highway safety countermeasure. A multimedia campaign with public seminars, in-plant safety programs, bumper stickers and ads in local newspapers was suggested as a more productive approach.

Some researchers felt that PSAs are ineffective for reasons related to the technical aspects of airing. Harris and Associates, Inc. (1974) suggested that a weakness of their study was the time of day PSAs were played and the inadequate logging by the TV stations. Lynn (1974) proposed that PSAs would be more effective if one would have greater control over media decisions.

The content and theme of PSAs has been discussed by some researchers. The most effective theme in establishing new behavior found by Leven and Rodnight (1973) was directed at the nervous system. The "clunk, click" jingle (clunk, door closes; click, seat belt on) was picked up by adults and children alike and after people heard it several times; they found it difficult to forget. Emotional and logical appeals were preferred in Lynn's (1974) study of 248 sophomores, although the "fear" theme also was found persuasive. Grimm (1977) also advocated the "fear" appeal as being useful in PI&E safety campaigns, but Robertson (1974) found that fear-instilling television PSAs were ineffective in promoting seat belt use.

Although the research done by Harris and Associates, Inc. (1976) was on the effects of a public advertising campaign on attitudes toward alcohol abuse rather than on the safety issue, the project nonetheless offers suggestions for the "perfect ad." These include: (1) covering the moralism-rationalism scale; (2) defining consequences in a personal meaningful way; (3) describing the kind of behaviors to which target subjects must be alert; and (4) appealing to media outlets. If the decisions about if and when to show PSAs are left to television personnel, then a successful campaign must produce PSAs which are appealing to the media people; otherwise they rarely, if ever will be shown.

The Effects of Mass Media PI&E on Knowledge and Attitudes. Several researchers have studied the effects of PSAs on knowledge and attitudinal changes. Heron (1977) found that television ads increased knowledge about the use of seat belts. By reviewing several research studies on restraint system usage, Grimm (1977) observed that the greatest benefit in campaigns is a change in attitudes about their usefulness. On the other hand, Mendelsohn (1973) in a study on driving and drinking found that media are relatively powerless in effecting changes in attitude.

Rochon (1977) used three television PSAs, three radio PSAs and two full page newspaper ads and measured changes in knowledge and opinions about the use of seat belts. From his large sample, he found the PSAs to be the most effective in changing peoples' opinions about the benefits of seat belts. The average change in attitude was small, but it was correlated with the advertising campaign.

The Effects of Mass Media PI&E on Behavior. Because child passenger restraint is a relatively new area, there are very few studies which address the issue of the effects of PI&E on CRD usage. One study by Boughton and Johnston (1975) looked at behavioral changes in Austrailian states with and without child restraint legislation. No behavioral changes were noted in the study, although the researchers suggest this might be due to their short publicity exposure. Pless et al. (1972) expressed the belief that public education on child automotive safety via the mass media has had limited success.

Fleischer (1972) conducted an extensive five-week campaign on radio and television and measured changes in seat belt usage. He found slight increases in usage in the "intensive" and "no-exposure" communities, but no increase in the "moderate-exposure" community. Such paradoxical results are unexplainable, but are a prevalent finding in studies measuring behavioral changes.

In Toronto in 1969, a campaign using radio, television, newspapers, posters, speeches and other media was launched to increase seat belt usage. The result was no significant change in use from before the campaign (Ontario Department of Transport, 1970). Robertson (1974) found that television messages urging safety belt use had no effect on use. Haskins (1969) also found inconclusive results in his review of research on safety communication campaigns.

On the other hand, Leven and Rodnight (1973) used a variety of mass media techniques in several parts of England and found a 3 to 16 percent

increase in use of seat belts with three weeks of the publicity. However, they also found a leveling-off effect occuring after the three weeks.

Mass media PI&E has been tried in most countries which have compulsory use laws. These countries show substantial increases in usage rates immediately after the effective dates of the laws (Ziegler, 1977; Pulley, 1975). In Ontario, Canada and Victoria, Australia the immediate increase in usage rates were followed by declines (Insurance Institute for Highway Safety, 1976; Andressend, 1972). Pulley (1975) points out that sustained high usage rates occur when there is a strictly enforced law along with the PI&E program.

The Medical Profession as a PI&E Component. The medical profession has been trying for a number of years to convince the American public that riding unrestrained in a motor vehicle is dangerous. The philosophy used by physicians primarily is that early learned habits and practices are the most difficult to modify. Therefore, several programs have been launched to orient parents and children to the use of CRDs for children. Through the efforts of the Physicians for Automotive Safety, a number of hospitals throughout the United States have programs which give instruction and encouragement to parents of new babies concerning restraining their children while traveling (Shelness and Charles, 1975).

There are studies which show that physicians, pediatricians and their staffs can influence parents to obtain and use CRDs (Bass and Wilson, 1964). A survey of 192 pediatricians of the Southern California Academy shows that over 70 percent teach parents initially about CRDs for their children, but fewer than three percent use followup instruction and education on every visit (Lieberman et al., 1976). There was a 20 percent increase (from 38 percent in 1963 to 58 percent in 1970) in number of members of the Academy of Pediatricians who advised parents of the value of using passenger restraints (Pless et al., 1972).

Reisenger and Williams (1977) report on education programs that have been undertaken at pediatrician offices and well-child clinics. They contend that although infant restraint use is increased because of these types of programs, there is room for doubt on some of the percentages reported. They believe the results may be biased because the program participants are volunteers who would be favorably predisposed and thus likely users of infant restraints. Their study included three in-hospital educational programs for post-partum women. They concluded that different levels of education and the cost of infant carriers influence the mother concerning the decision to provide a CRD for protecting her child. The information and education techniques increased the number of decisions to use a restraint.

Washington and Wisconsin have programs where emphasis is placed on educating the mother on the importance of safely transporting the child home from the hospital and of using that initial first step for continued protection (Shelness and Charles, 1975). Kanthor (1976), in a study involving mothers, found that 69 percent of the counseled and 42 percent of the uncounseled women were using CRDs at the six-weeks visit back to the physician.

Allen and Bergman (1976) found that 60 percent of those parents who received literature, viewed a film and witnessed a demonstration of CRD use decided to obtain CRDs for their use while 54 percent decided to obtain CRDs

after receiving only the literature. A surprising 71 percent purchased or obtained CRDs after a combination of only the literature and the film. In another study, Hall and Council (1978) found 26 percent of the children were riding in CRDs, but only about 5.9 percent were secured properly. These results followed an intense educational program with physicians and other public health personnel.

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PART III

PUBLIC INFORMATION AND EDUCATION ACTIVITIES

Image/Slogan Selection

This task was completed at the start of the project. The CPS Program logo is used on most materials to assure easy identification of the program.

Brochures and Posters

The brochures, "Protecting the Child Passenger: A Matter of Love," were distributed to all of Tennessee's pediatricians, physicians who treat children, hospitals, public health clinics, obstetricians and child development personnel. The original free-standing display posters which were designed and produced to accompany these brochures were found to be deffective upon delivery. This resulted in the design and production of alternative posters and the ordering of plexiglass brochure holders.

Tennessee's nine regional health administrators/directors assumed responsibility for the delivery of the brochures in the counties within their districts. The brochures were hand delivered to these nine administrators/directors by either Highway Safety Planners (under the direction of the Governor's Highway Safety Program office) or by CPS Program staff members. The nine regional administrators/directors also assumed responsibility for delivery of the posters and brochure holders (which they received at a later date). Likewise, the state's nine regional child development coordinators assumed responsibility for the delivery of brochures to all of the personnel under their jurisdiction.

Because four of the major urban areas of Tennessee (Chattanooga, Knoxville, Memphis and Nashville) are outside of the jurisdiction of the regional health administrators/directors, the delivery of brochures, posters and holders was handled by the CPS Program staff personnel in Chattanooga, Knoxville and Nashville. The delivery of these materials in Memphis was handled by the Director of Injury Control in the Memphis and Shelby County Health Department. In addition, brochures were mailed to all the obstetricians in the state (with the exceptions of Nashville and Knoxville obstetricians to whom brochures were hand delivered).

With distribution of the brochures across the state completed, efforts were made to answer new requests for copies. In addition to the CPS Program delivery system, two state agencies requested substantial numbers of brochures and assumed responsibility for distribution of the materials. Visits were made to various clinics and hospitals in Nashville to note the use of the brochures. One clinic featured a special display of CRDs and CPS Program materials. Many individual requests from hospitals, clinics, pediatricians and doctors' offices were accommodated.

Overall, demand was so great that supplies were depleted. The brochure was revised, and another printing of 250,000 was ordered. The new brochure features updated information and a color photograph on the cover. Demand for the brochure continues to exceed expectations.

A new poster has been developed, and its production is planned for the first quarter of 1979. The concept is that of an enlarged cartoon strip featuring simple language that shows how one father reminds himself to protect his child. The appeal is directed primarily toward the lower socioeconomic groups.

Public Service Announcements, Interviews and News Spots on Television

In the first half of 1978, Nashville was the only target area to get the comprehensive PI&E treatment. In the Nashville area, the law and CPS activities received excellent television coverage initially. Three television public service announcements (PSAs) on child passenger safety had been developed by the end of March 1978. The first PSA, which was produced by the Governor's Highway Safety Program in conjunction with the Urban Observatory of Nashville, featured a popular Tennessee State University football coach who compares protecting his football players to protecting "your baby." The theme of the second spot focused on the enforcement aspect of the law with a message from Col. Dawson, Commanding Officer of the Tennessee Department of Safety. The third public service spot showed two "happy" children playing with a dramatic message on child passenger protection ending the spot. Television stations ran the public service spots an average of 20 times per month.

In the first Quarter of 1978, Nashville's television stations also gave excellent coverage to the law and the CPS Program. Air time included extensive news coverage as well as feature programs such as Teddy Bart's "Noon Show" and "Morning Watch" on which CPS Program members were interviewed.

During the second quarter, Nashville's television stations continued to give excellent support to the CPS Program PSAs. While each station varied in its policy concerning PSAs, all were cooperative in working with the CPS Program staff. Airing of the PSAs averaged approximately four to five times a week on each station; the stations did not keep summary accounts of how many times the various PSAs ran.

Two Nashville television stations gave coverage to the first national CPS conference on May 10-12, 1978. This included coverage of conference activities, interviews about the conference and the CPS Program and special attention to the CPS exhibits and materials. A special display of automobiles with unique safety features, such as the passive belts and air bags, also was featured. One Nashville television station also featured a news spot on CPS Program data collection activities in June. This news feature was aired the evening after data collection activities in Nashville had been completed.

In the third quarter, of 1978, the three PSAs were airing in Knoxville, Nashville and Memphis. (Memphis also produced one of its own.) In Knoxville, the three commercial stations started airing the spots July 1, 1978. Each station aired spots approximately 12 to 15 times in July. The number of showings tapered down within a couple of months.

In Knoxville, three CPS Program staff members were interviewed on a half-hour talk show produced by WSJK-TV called "Two-Nite." All three Knoxville TV stations were present on July 17 at the mayor's special press conference to announce the stepped up enforcement of the law.

On September 14, several CPS Program staff members and Dr. Martha Bushore of the East Tennessee Children's Hospital appeared on a one-hour talk show called "Today in Tennessee" at Knoxville's WATE-TV Channel 6. The law, child passenger safety and the program were discussed.

In the last quarter, the television PSAs released in Nashville, Knoxville and Memphis showed a marked decline in the number of airings. Each PSA was aired about seven to eight times per month per station initially; this dropped to three to four times by the third month and one to two times by the sixth month. As time passed, the likelihood of an old PSA being aired was negligible. Memphis has little PSA exposure at the moment; Nashville essentially has none. This points up the need for a larger number of PSAs and for staggering their release if continued exposure is the goal. Staggered release of the available PSAs is planned for future implementations of the comprehensive plan.

Promotion of CRDs via television was accomplished by another avenue--press conferences. On November 6, a press conference was held in Memphis on the CPS Program and the loaner program. The county Mayor and a representative from the city Mayor's office were featured spokesmen on behalf of the program, urging their constituents to protect their young children. Dr. George Lovejoy, Director of the Memphis-Shelby County Health Department, announced the commitment of his department to the program. Activities in the Memphis area relative to the CPS Program were discussed. All television stations in the Memphis area carried excerpts of the press conference in their news broadcasts.

On December 8, the CPS Program was joined by Mayor Randy Tyree of Knoxville and his family in a press conference to demonstrate the Mayor's support for the program by showing his children in CRDs. In addition to the Mayor's backing, CRDs also received the endorsement of Santa Claus. The conference also provided an opportunity to distribute radio PSAs. The press conference received some coverage by all three Knoxville television stations on their news broadcasts.

On December 15, a meeting was held with the Mayor of Chattanooga, the Commissioners of Chattanooga and the County Executive of Hamilton County on the CPS Program. These local officials then held a press conference announcing their support and concern for child passenger safety. (CPS Program staff members also met with representatives of local agencies and civic groups to plan a Chattanooga Child Passenger Safety Week to be held in late January or February, 1979.)

In addition to the press conferences, one CPS Program staff member did an interview for Channel 10 News in Chattanooga which was shown after the data collection for the second operational period. A presentation to the Knox County Foster Parents Meeting was covered by the Knoxville television, press and radio.

Radio Public Service Announcements, Interviews and News Spots

Prior to the first quarter, two PSAs were developed for use by radio stations in Nashville. Four stations ran these spots. One PSA was distributed before Christmas and one was distributed in January. Sixteen radio

stations aired the PSA on the average of twice a week. An attractive mailing sticker sent to the program directors helped to promote the airing of these public service announcements.

News interviews with CPS Program staff and other child passenger proponents were given upon request, especially when activities such as the national CPS conference provided special interest for the news media. For example, CPS Program staff members were interviewed by WBIR-TV in Knoxville when a young child being held in his mother's arms was injured fatally in an automobile accident.

In July, the radio spot "First in the Nation" was released to 13 Knoxville area stations. (This spot was released earlier to 13 Nashville stations.) In August, 11 Memphis stations received the spot.

Stations that returned cards indicating how many times a week they aired the spots indicated numbers of showings ranging from a high of 30 times a week down to five times a week. Most stations indicated between 10 to 15 airings.

A third radio PSA was developed consisting of a testimonial of Carolyn Trabue of Nashville concerning an accident she had involving herself and her one-year old twins. This spot was released in Nashville, Knoxville and Memphis. WOKI, Oak Ridge, set up the telephone interview with Ms. Trabue on which the spot was based.

A three- to four-minute radio spot was produced July 25 at WUOT, Knoxville, for distribution on National Public Radio. This spot gave a brief explanation of the CPS Program and the CPS Law. A 30-minute talk show on WUOT was produced August 25. This was a follow-up of the three-minute talk show given on July 25th. The CPS Program and its importance to Tennessee families was explained.

Airing of Radio PSAs followed the same decay pattern as that observed for television PSAs. However, radio PSAs, being cheaper to produce, do not have the same limitations.

Radio promotion of CRDs via press conferences paralled the description of the television promotion. Coverage in Memphis and Chattanooga was extensive; coverage in Knoxville was minor. In addition to the press conference coverage in Chattanooga during December, two radio talk shows for station WMBW-FM were taped.

Newspaper Coverage

Newspaper coverage was an important aspect of the CPS Program PI&E activities during the first months of the project. In the first two weeks of January, more than 60 articles were featured in more than 30 newspapers. Although a concentrated effort to obtain maximum news coverage was made only in Nashville, newspapers across the state gave coverage to the law. These included news items, feature articles and editorials. One special news feature included an excellent article from a Nashville paper, The Tennessean Magazine. In Nashville, direct communication was established with the major newspapers;

news people were very supportive. A large portfolio containing all news clippings from across the state is maintained on a day-to-day basis.

In Nashville, where the national CPS conference was held in May, both major newspapers covered the conference with special interviews devoted to guest speakers. General news coverage during this period focused on accidents involving small children. For example, in some areas such as Memphis, when accidents involved children under four years of age, the news media brought attention to enforcement of the law, the importance of the law to child passenger safety and the use of CRDs. Accidents involving children received attention in local newspapers throughout the state. However, the CPS Program did not actively promote news coverage, e.g., special feature stories in any areas other than the comprehensive plan areas.

CPS Program staff and advisory panel members were interviewed for an article in Parade. This article appeared in July.

Newspaper clippings were reviewed, and the number of articles appearing in each target area were counted (see Table III-1). The clippings were obtained from a local clipping service. (The clipping service estimates that the miss rate for spotting a relevant article is between five and ten percent.) Of the three comprehensive treatment sites, feature story writers in Knoxville and Nashville have given the program the most coverage. The low coverage in Memphis may be a result of the delay in signing the Agreement of Understanding with the Memphis and Shelby County Health Department which is operating the basic PI&E program in the Memphis area.

Knoxville's morning paper carried a large front page picture of Dr. Heathington and Mayor Tyree from the July 17 Mayor's press conference concerning enforcement of the law.

In the target areas, the law and the CPS Program are now declining in news value. Yet, in the nontarget areas, there has been an upsurge of interest, perhaps reflecting their initial awareness of the topic of child passenger safety.

Magazine Articles

Some of the magazines which reported on child passenger safety are:

February 1978*
The Tennessean Magazine, "Immunizing Against the Highway Epidemic"

March 1978
Saturday Evening Post (Medical Mail Box), "The Seat of the Problem"

March 1978
Ladies Home Journal, "Car Seats for Kids" Ralph Nader

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*Articles that mention Tennessee

TABLE III-1

NUMBER OF ARTICLES, EDITORIALS AND ADVERTISEMENTS
PROMOTING CHILD PASSENGER SAFETY - 1978

	Jan. 1 - June 30	July 1 - Dec. 31	TOTAL
Chattanooga	5	22	27
Knoxville	16	44	60
Tri-Cities	3	36	39
Nashville	11	28	39
Memphis	2	20	22
Rural	4	10	14
Nontarget Areas	75	136	211
TOTAL	116	296	412

April 1978*
The Nation's Health, "Tennessee Immunizing Against Child Auto Deaths"

Spring 1978*
Law Enforcement Journal (Tennessee), "Help Tennessee Stay First in Child Passenger Safety" Emily Spielman

May 1978
Woman's World, "Have Baby, Will Travel"

July 16, 1978*
Parade, "Is Your Child Riding in a Car Seat?"

July 1978*
Child Passenger

November 1978*
Traffic Safety, "The First Six Months of Tennessee's Child Restraint Law"

Fall 1978
Transportation U.S.A. (Search Light on Safety), "Car Restraints"

November 1978
Good Housekeeping, "Car Restraints for Babies"

November/December 1978*
Vital, "Car Safety: How Safe are Babes in Arms"

December 1978*
The Tennessee Page, "A Matter of Love...Protecting the Child Passenger" Robert S. Sanders

December 1978*
American Association for Automotive Medicine (Quarterly 4), "International Year of the Child 1979...Child Restraints"

December 1978
Tennessee Public Health Association NEWSLETTER, "Memphis Initiates New Phase of Restraint Program"

The majority appeared in the last quarter of 1978, and a number of them refer to the Tennessee law. This is another indication that awareness of the safety hazards for child passengers is on the increase. The special nature of some of the publications suggests that the awareness will be most apparent among health and traffic safety professionals. As these professionals spread the word, there should be an impact on the awareness and perhaps on the behavior of the general public.

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*Articles that mention Tennessee

Billboards

A billboard was developed during the first few months. Posting of the billboards in the Nashville area occurred in February. Two companies were used in posting the billboards to enable posting in counties surrounding Nashville as well as within metro Nashville. Twenty-three billboards were posted. The posting was staggered, with individual boards being posted for varying lengths of time. Securing billboard space was difficult since public service billboard space is limited. This was particularly true at times when legislative sessions were underway in Nashville. Miniature billboards (exact replicas of the billboards in plastic holders) for desk use were produced. These were distributed to legislators who supported the law and other selected individuals.

In July, Creative Displays, a Knoxville outdoor advertising company, posted 35 public service billboards in the Knoxville area.

In September, the Regional Coordinator for the Office of Child Development made contacts with Lamar Advertising in Nashville on behalf of the CPS Program. Commitments were received for one community announcement board which read "Lamar Salutes: Tennessee Legislation...Child Automobile Safety Seats Are a Matter of Love and of Law, For Kid's Sake!" and for three other public service boards which were posted the second week of November.

Film/Audiovisual Presentations

A film for use with civic groups, health officials, business firms, high school classes, law enforcement agencies and other groups was seen as essential. In an effort to utilize existing audiovisual resources on child passenger safety, the CPS Program purchased 20 copies of Don't Risk Your Child's Life, a 12-minute film on CRDs developed by Physicians for Automotive Safety. Because of the general nature of the film and its excellent presentation, it was felt that the 16mm film would be sufficient to meet the demands of anticipated CPS Program activities across the state. The film became the primary audiovisual tool used by CPS Program staff.

The staff also has at its disposal a wide selection of slides that can be used in conjunction with printed materials to give presentations before civic groups and other organizations. Film/slide presentations were given to many people in a number of forums including:

- A groups of sales personnel and customers at Sears in Nashville;
- A group of family and child health educators in a graduate seminar in Child and Family Studies at The University of Tennessee, Knoxville;
- The CROCUS (a group of educators of young children) conference in Cookeville;
- The CPS Program Advisory Panel at the September 19 meeting in Nashville;

- The Early Childhood Education Conference in Nashville;
- A statewide meeting of the Office of Child Development staff;
- Arizona Women's Highway Safety Leaders, Arizona;
- Tennessee Association on Young Children Conference, Knoxville;
- Film for 800 high school students, Clinton/Oak Ridge;
- National Council on Family Relations, Philadelphia, Pennsylvania;
- North Carolina Highway Safety Meeting, Raleigh, North Carolina; and
- Employees of the Union Carbide Corporation in Oak Ridge on three different occasions (to a total audience of over 1,000).

In addition, the film was used in the training of observers for the second operational data collection.

Portable Displays

The design of a portable display consisted of lighted panels, transparencies, brochures, demonstration seats and other information. It is elaborate and is intended for use at larger conferences, meetings, programs, malls and special events. A second, less complicated display was designed to meet the increasing demands for exhibits in smaller display areas.

In the first half of the year the portable exhibit was used extensively in Nashville and at conferences, meetings and other special events across the state. Because of the high demand in the second half of the year, a second full-scale traveling exhibit was constructed to provide coverage on conflicting dates and to permit the refurbishing of the first unit. An exhibit was displayed at the following locations:

Aug. 21-26:	Washington County Health Fair
Aug. 24-Sept. 5:	Green County Health Fair
Sept. 8-16:	Tennessee Valley A & I Fair, Knoxville
Sept. 15-24:	Tennessee State Fair, Nashville
Sept. 21-Oct. 1:	Mid-South Fair, Memphis
Sept. 22-24:	Smyrna Air and Transportation Show, Smyrna
Oct. 4-5:	Heart Association, Nashville
Oct. 4-5:	West Town Shopping Center Health Fair, Knoxville

In most cases the exhibits were manned by CPS Program personnel, a procedure which is costly in terms of resources. It was found that the full-scale exhibit, with only minor modifications, can be used as a stand-alone unit, requiring only transportation, set-up and dismantling. It is now used in this latter mode when there are conflicting demands on support personnel.

Loaner Programs

The Memphis-Shelby County Health Department, in cooperation with the CPS Program, agreed to help develop and administer a loaner program for low-income families in the Memphis area. CPS Program provided 300 infant restraint devices for the Health Department.

Although the Loaner Program was scheduled to begin July 1, 1978, there was a delay in the signing of the Agreement of Understanding between the Transportation Center and the Memphis-Shelby County Health Department. The agreement had to be signed by both the city mayor and the county executive and, although there seemed to be no explicit reason to delay, the agreement was not signed for several months.

The Memphis-Shelby County Health Department was assigned the tasks of publicizing the program and of distributing the CRDs. Educational programs were given in all of the prenatal clinics in the Memphis area. Expectant mothers were encouraged to obtain infant restraint devices through the Loaner Program. To participate in the program, mothers had to meet income guidelines set by the Memphis-Shelby County Health Department, live within Shelby County and own a car. If they met the requirement, they could borrow a CRD for $3.

The first infant carriers were distributed in November. Most of these went to mothers who attended the prenatal clinics. Because only a few low-income mothers attended prenatal clinics and because there was a time lag between when mothers heard about the Loaner Program and when they actually picked up the infant carriers, this contact method was found to be rather slow. Therefore other strategies were employed to inform the public of the Loaner Program. A news report announced the program and encouraged people meeting income guidelines to apply. Notices were posted in places where new mothers might see them, e.g., immunization clinics, community health centers.

These approaches succeeded in informing people of the program. One drawback was that persons who called to inquire about the program had to be screened in order to establish that they met the criteria to participate. This took additional time but was no problem.

By the end of December, another strategy was being developed to inform more low-income mothers. Names and addresses will be obtained from the birth records from the city hospital whose patients are classified as indigent. These mothers will be sent a letter explaining the program and encouraging them to call for an appointment. It is anticipated that this method of contact will reach the majority of low-income mothers and will give them an opportunity to borrow infant carriers for their babies.

When parents come in to pick up their infant carrier, the program and the rules and regulations concerning the borrowing of the device are explained.

All parents sign a release form releasing The University of Tennessee and the Memphis-Shelby County Health Department from any liability. Parents are allowed to keep the device for nine months or until their child is 20 lbs. At that time, they must return it to the Memphis-Shelby County Health Department.

Chattanooga was the other site in which a Loaner Program was to be developed. Because the comprehensive plan was not scheduled to begin until January 1979, there was little contact with officials in Chattanooga during 1978. In December, discussions began concerning the components of the comprehensive plan. The Loaner Program was mentioned and suggestions were made as to who might sponsor the program. As discussions continued and as child passenger restraint became a more acceptable concept, the health officials of the Chattanooga-Hamilton County Health Department became interested in the project and offered to administer the program. Final negotiations and the further development of the program will be carried out during the first few months of 1979.

Driver Education Programs

Developing a curriculum to be incorporated into the driver education programs was recommended for two reasons. Because of the emphasis on passenger restraint in the driver education curriculum, it seemed only natural that child passenger restraint should be included in the discussion. Second, developing attitudes regarding proper safety behavior early in a young person's development appears to be an influential determinant in behavioral changes. Thus, including information about child passenger restraint in the regular driver education curriculum will reach many young people as they are learning about safe driving techniques and will help to instill proper attitudes and behaviors to using appropriate restraints for all persons riding in cars.

During 1978, a driver education instructional packet was developed and pretested. The pretesting took place in eight sections of high school education classes in the Nashville school system during October 1978. Two instructors in two high schools (with approximately 200 driver education students) used the materials. The purpose of the pilot test was to evaluate and revise the packet before making the materials available to driver education programs throughout the state.

A learning packet approach was selected because it enables students to progress at their own individual learning paces. Materials in a learning packet were constructed so that self-directed learning could occur with minimal involvement of the instructor. Ward and Williams (1976) described the approach as a new and exciting technique. In addition to printed subject matter, audio and visual materials were made an integral part of packet learning. This exposed the student to a variety of materials.

Design of the Learning Packet. Components of the learning packet included a written, cartoon-illustrated booklet, pre- and posttests, teacher instructions, teacher evaluation form, a 16mm film, a cassette tape and a life-size doll and infant carrier.

The booklet, "Let's Take a Look at Child Passenger Safety," is written directly to the student. Objectives for studying child passenger safety and instructions for using the learning packet are provided at the beginning of the booklet. Vocabulary words are listed for each activity. Specific instructions were continued throughout the booklet.

Activities in the booklet include a wide range of facts and material on child passenger safety. Information about the passage of Tennessee's law, background material on traffic safety and children, and detailed information and drawings of CRDs and their usage are provided.

The cassette tape activity presents a soap-opera story with a musical background titled, "A Day in the Life of Debbie and Bill." The soap-opera drama portrays a young Tennessee couple as they learned about CRDs from an obstetrician. Important facts about the use of CRDs are related in the story.

An actual CRD and a doll enables the students to see a device, to learn how to use it and to practice placing the doll in the seat. This "hands-on" activity also is used for enrichment activities.

Other activities involve students doing their own survey of child restraints in use as well as keeping records of any advertising or PSAs they observe or hear.

The last activity, a film titled, Car Safety: Don't Risk Your Child's Life, concludes the safety unit. The film also is suggested for use in school assemblies and classes studying child care. Each of the seven activities contain self-testing questions which the student is expected to answer before going on to the next activity.

Pilot Test Results. The pilot-test instructors commented that the film, cassette tape and doll-seat activities seemed to be especially interesting to students. The cartoon illustrations also were appealing to the classes. Several minor changes in the booklet were suggested. A few changes and an additional poster-making activity will be included in the revised booklet.

The teacher instructions in the packet explain a number of instructional approaches that could be used with the materials. The packet is designed to pemit the instructor to choose from approaches such as small-group instruction; individualized instruction; large-group, teacher-centered instruction; and activity-center instruction.

During 1979, extensive use of the driver education instructional packet will be made in Knoxville and Chattanooga. Based on the results of the information obtained, the materials will be revised for mass distribution throughout the state. Plans for distribution have been discussed with top officials in the Department of Education who are enthusiastic in seeing that this curriculum is implemented in all driver education programs in the state.

The Network of Support Groups

During 1978, the CPS Program emphasized establishing and cultivating a network of support groups across the state. Because of the enormous task of distributing information regarding the law and the importance of using CRDs,

the Nashville and Knoxville offices had to rely on central distribution points to disperse the information.

As part of the basic state plan, brochures and posters were distributed through a myriad of channels. This task was shared between the Knoxville and Nashville offices. As the comprehensive plan was implemented in various sites, the contact and communication system became extremely complex. The basic approach to the comprehensive plan was to saturate the area with information at every possible level using every possible contact. At the same time direct contacts were being made by personnel from the project offices, attempts also were being made to establish a grass-roots network for the purpose of maintaining continuous child passenger safety activities.

The establishment of support groups is important for two reasons. Because the CPS Program is funded for approximately two years, it is essential to establish the interest and commitment among state, regional and local professionals so that efforts started by the CPS Program can be continued after the project is over. There is a general feeling among CPS Program staff that a local contact will be accepted more readily by the community. Therefore, if someone in the community needs additional information or a speaker, they more readily would contact a local person rather than write to the Nashville or Knoxville offices. Therefore major contact systems were developed in health, highway safety, child development/home economics, community groups and suppliers of CRDs.

The project developed several strategies to strengthen the network system it was beginning to develop. This included a newsletter titled "CPS UpDate." The newsletter summarizes the activities of the project and reports major child passenger safety events which occured throughout the state.

Health System. The health system is considered a major component of the state communication network. Because of the support from the medical field in the passage of the law, it is important to establish a strong network among the deliverers of health care. State, regional and county health departments were contacted directly by project staff. In some cases, these offices passed information regarding the CPS Program along to the practioners. In other cases, project staff contacted practioners directly by placing brochures and posters in doctor's offices, hospital waiting rooms and public health clinics. Direct mailings were sent to all pediatricians in the state. Over 1,200 physicians were contacted directly by the project. Many of the pediatricians are returning accident survey forms.

Through contact with the Tennessee Hospital Association, letters were sent to all hospitals informing them of the law and of available materials and requesting their cooperation in distribution of the information to their staff and to patients. Hospitals also were asked to report emergency room accidents involving children and whether or not they were in a CRD. Presently about 80 out of 150 hospitals are returning postcards on accidents involving injured children.

Figure III-1 illustrates the contact/distribution network for the health system.

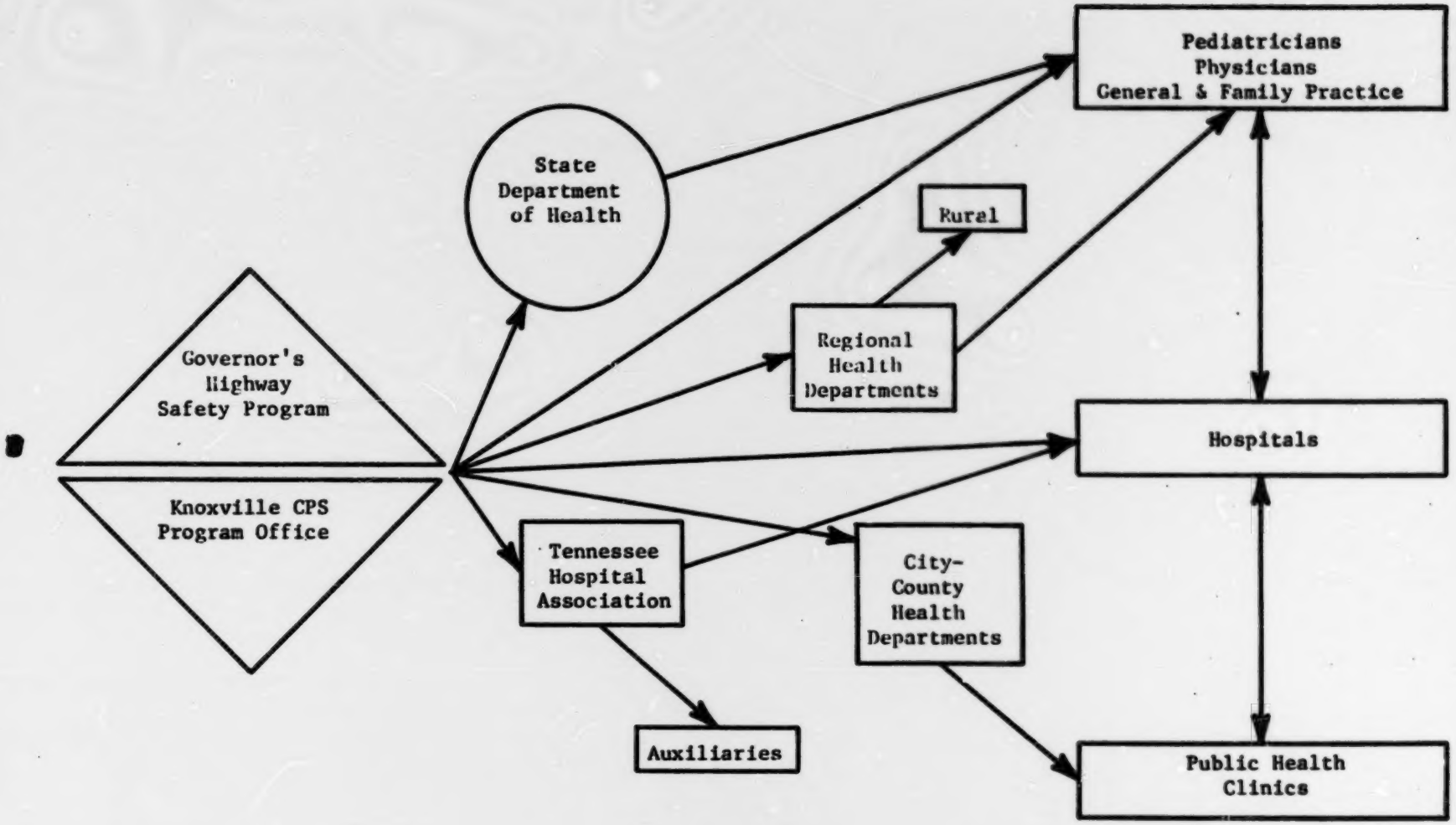


FIGURE III-1

HEALTH SYSTEM

Highway Safety System. The highway safety system is a complex network created by the separate jurisdictions of the law enforcement agencies. Because it was decided that no arrests would be made during the first six months of 1978, the main emphasis with the highway safety system was one of information and education. Establishing supportive contacts among the law enforcement agencies was also important because of a general feeling by officers that the Child Passenger Protection Act was difficult to enforce.

The State Highway Patrol was cooperative from the beginning of the project, and a representative serves on the advisory panel. However, obtaining the cooperation of county and city enforcement agencies required the trial of various strategies. Because each agency operated independently, it was decided that an appeal through the Fraternal Order of Police to all its members might be most effective in increasing enforcement officer commitment. A plan was then developed to contact the police officers directly through a special mailing. This is scheduled for 1979.

Because all officers have to accumulate a certain number of training hours per year, contact with the training academies was made. A series of training sessions were held in Knoxville explaining the law and the officer's role in enforcing the law. This proved very effective in distributing information as well as in establishing contact and in developing rapport with law enforcement officers. Continual contact with the law enforcement agencies was maintained throughout the year. Attempts were made to obtain accident data involving children. A special traffic accident report supplement was developed for arresting officers to complete and return. Because of the independent nature of each agency, these records were not always accurate or up-to-date. However, in time, it is felt that the officers will become more committed to the law and will fill out the forms accurately and consistently.

One of the goals of the project included contacting the judges to make them aware of the law. Encouraging the judges to waive parents' fine if they bring a receipt of a CRD purchase was another goal of the project. Judges were contacted on a personal basis in some of the target areas. This was a slow process, and a more systematic method of contacting the judges was developed by the end of 1978. Names and addresses were obtained from the Tennessee Department of Safety, and a plan was in process to send each judge a personal letter. This will be implemented in 1979.

Figure III-2 illustrates the contact/distribution network for the highway safety system.

Child Development and Home Economics. Tennessee has a strong child advocacy system in the state Office of Child Development (OCD). With the director serving on the CPS Program's advisory panel, there has been strong support from the child advocacy network across the state from the beginning of the project. Each of the nine regional OCD directors have councils which are made up of members of the community who, in some way, work with parents of young children. Because the purpose of the OCD offices is to promote programs to enhance the health, safety and well-being of children across the state, it was natural that this system was used extensively. Information distributed through these channels covered a diverse group of child advocates.

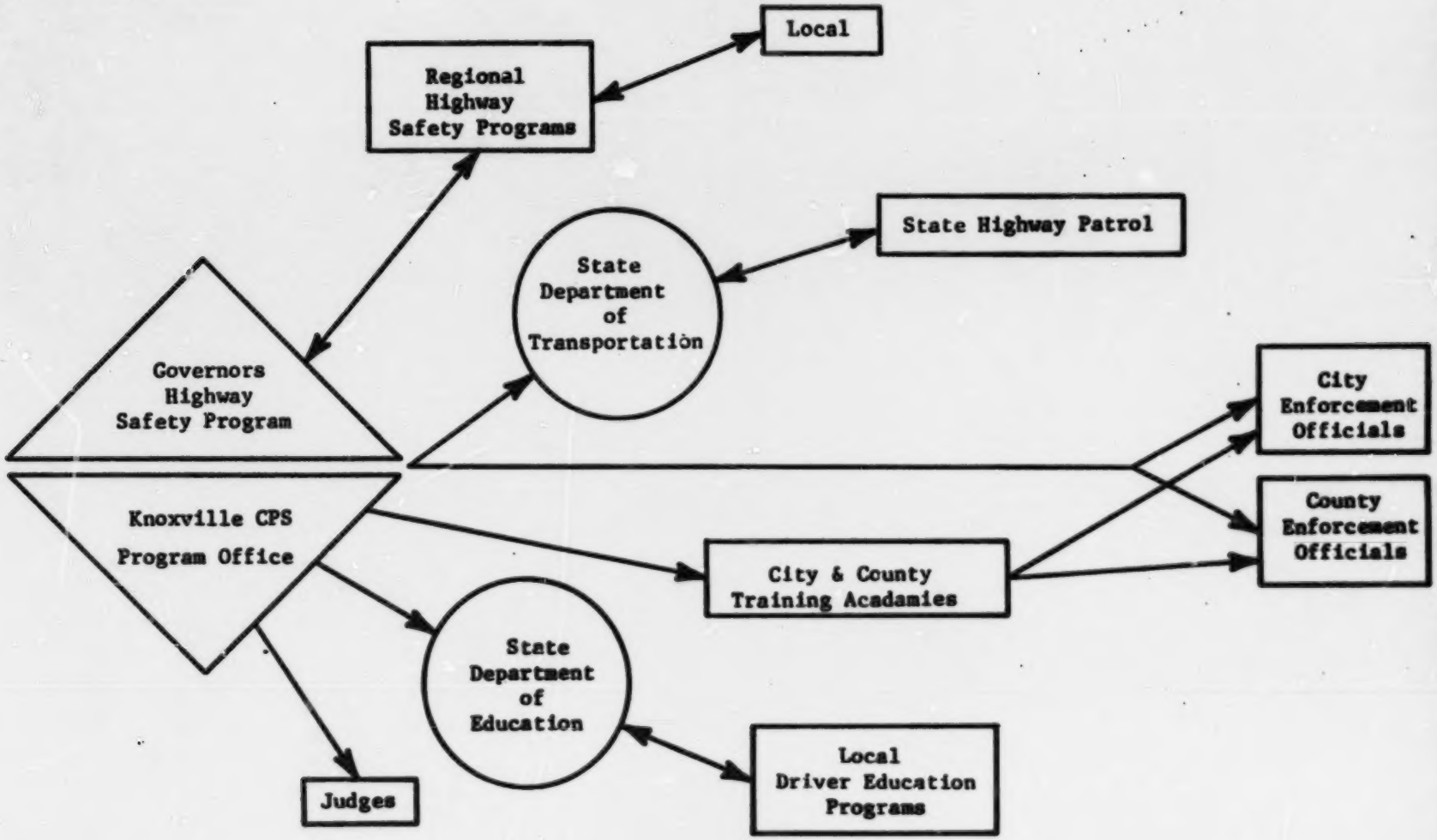


FIGURE III-2

HIGHWAY SAFETY SYSTEM

The project has relied heavily on the leadership of the regional OCD directors. In most cases they have rallied behind CPS Program efforts. They also have been creative in developing and promoting activities in their own areas based on the need of their communities.

Contact with both the state and regional OCD offices also was made to participate in professionally related meetings and to distribute information to day-care centers and to prenatal groups such as La Leche and Lamaze.

Additionally, development of a preschool and a high school family life education curriculum was stimulated through the CPS Program. The preschool curriculum is being designed to be used in day-care centers, nursery school programs and early education classes to make the children more aware of how to ride safely in cars. The high school family life curriculum was developed for use by teachers in home economics and related classes. This curriculum will be made available to every member of Home Economics Education Association both in Tennessee and across the nation and will spread information regarding the need for child passenger safety.

Figure III-3 illustrates the contact/distribution network for the child development and home economics system.

Community Systems. In addition to the more formal statewide systems just described, it appeared necessary to develop communication networks among community groups. Community groups, once they become committed to child passenger safety, can help diffuse information through their various civic activities and functions. In fact, one of the striking impacts of the mass media attention focused on child passenger safety has been the degree to which this exposure facilitates getting the attention and support of community groups. Although the original target groups were parents of young children, it seems that the heightened awareness of the general public has long-term payoffs in building financial and philosophical support for programs to reach the target groups. For instance, civic groups might adopt a special project in working with hospital groups, develop speakers bureaus, or develop loaner programs. Also the strengthening of broadly based public acceptance and support for the law is extremely important. These types of benefits to the program from mass media attention merit serious consideration.

Opinion leaders such as elected officials and prominent citizens have participated in a wide range of CPS Program activities. Although presently this system is less highly structured than the others discussed, nevertheless, several activities were accomplished during 1978.

Letters were sent to civic groups in several target areas. This was followed up in some cases by personal contact. In a few instances, groups became extremely supportive and involved. In other cases, the group already had activities planned up to two years in advance but were interested in pursuing child passenger safety at a later time. Contacts with civic groups require much attention in order to develop and maintain commitment. Once groups become committed, it appears they will follow through with some type of project.

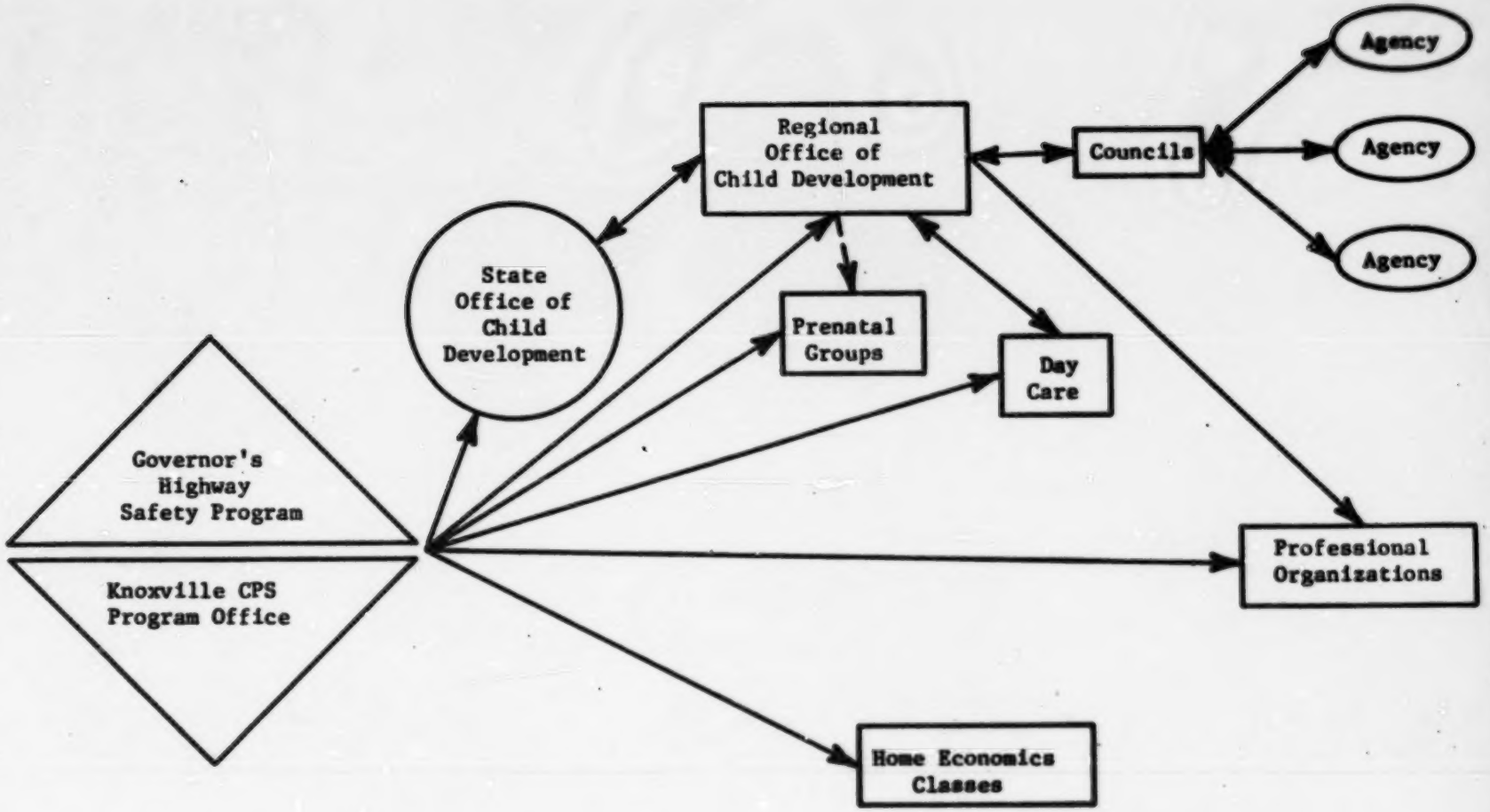


FIGURE III-3

CHILD DEVELOPMENT/HOME ECONOMICS SYSTEM

Each major urban area offered similar opportunities for industry participation. For example, over 45 major industries in Nashville were contacted and informed of the materials of the CPS Program. All industries were offered the opportunity to have a speaker come to one of the safety meetings. A telephone conversation followed up the letter. A few companies invited a speaker to talk to their employees; others put information in their newsletters and other publications. Informal contacts were made with industries in the other target areas resulting in talks and information being distributed to employees.

Several contacts were made with local automobile dealers in an attempt to promote child passenger safety through an advertisement campaign or through offering a free CRD to young couples when they purchased a car. Attempts made to attend state and regional automobile dealer association meetings met with some resistance, possibly due to the increased government regulations being placed on the automobile industry. However, some progress with dealers has been made when CPS Program staff members have been able to meet directly with individuals. Additional personal contact and commitment needs to be established before the automobile dealers as a group will actively support and promote child passenger safety.

Attempts have been made to contact Parent-Teacher Association groups throughout the state. Project personnel have given talks at several meetings. Because a more comprehensive approach is needed, attempts have been made to reach only the leaders and more enthusiastic members at state and regional meetings. The 1979 state convention will be an opportunity to reach this group.

Figure III-4 illustrates the contact/distribution network for reaching community groups.

Suppliers of Child Restraint Devices. The project felt it was necessary to develop a system of contacts with the suppliers of CRDs to assure that CRDs were available across the state, especially in the target areas. Therefore, at the beginning of the project, all manufacturers were contacted. Communication is maintained with these manufacturers. When possible, records are kept of CRD sales in Tennessee. Lists of retailers and distributors are maintained so they can be contacted directly by project personnel.

The CRD manufacturers have been extremely supportive of the project from its beginning. This is evidenced by their enthusiastic response to project staff members' request that they send sample CRDs for the project's use in its talks and demonstrations throughout the state. Many manufacturers have donated additional CRDs for drawings at various fairs and other special events in the state. Also, sales representatives are sent to participate in the fairs and talk to inquiring parents.

Figure III-5 illustrates the contact/distribution network for working with CRD manufactures and dealers.

Formal and Informal Network. Although it is important to understand the formal communication network, it is also important to realize that a strong informal network that exists which assures the effectiveness of the larger network. In the informal network, communication lines are crossed between and among systems. Most communication is based on personal contacts or personal interest of the professionals involved. Therefore a regional director in the

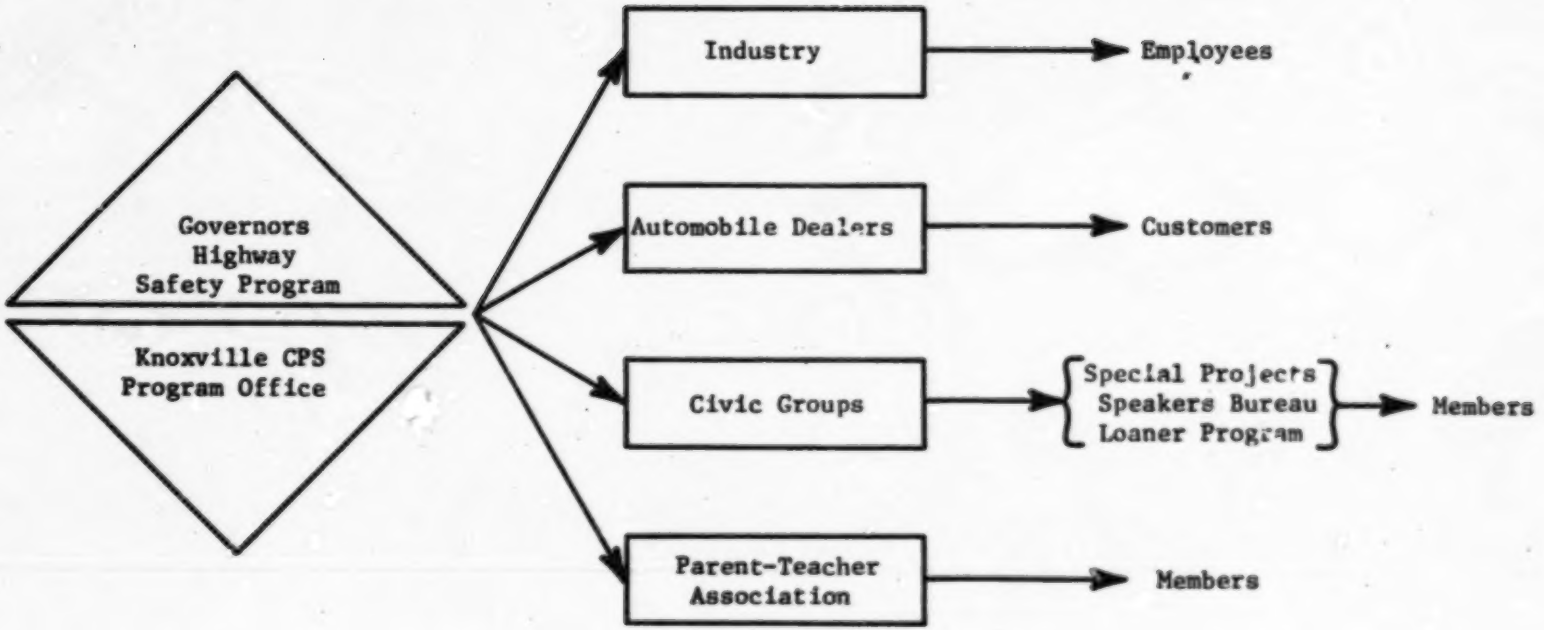


FIGURE III-4

COMMUNITY GROUPS

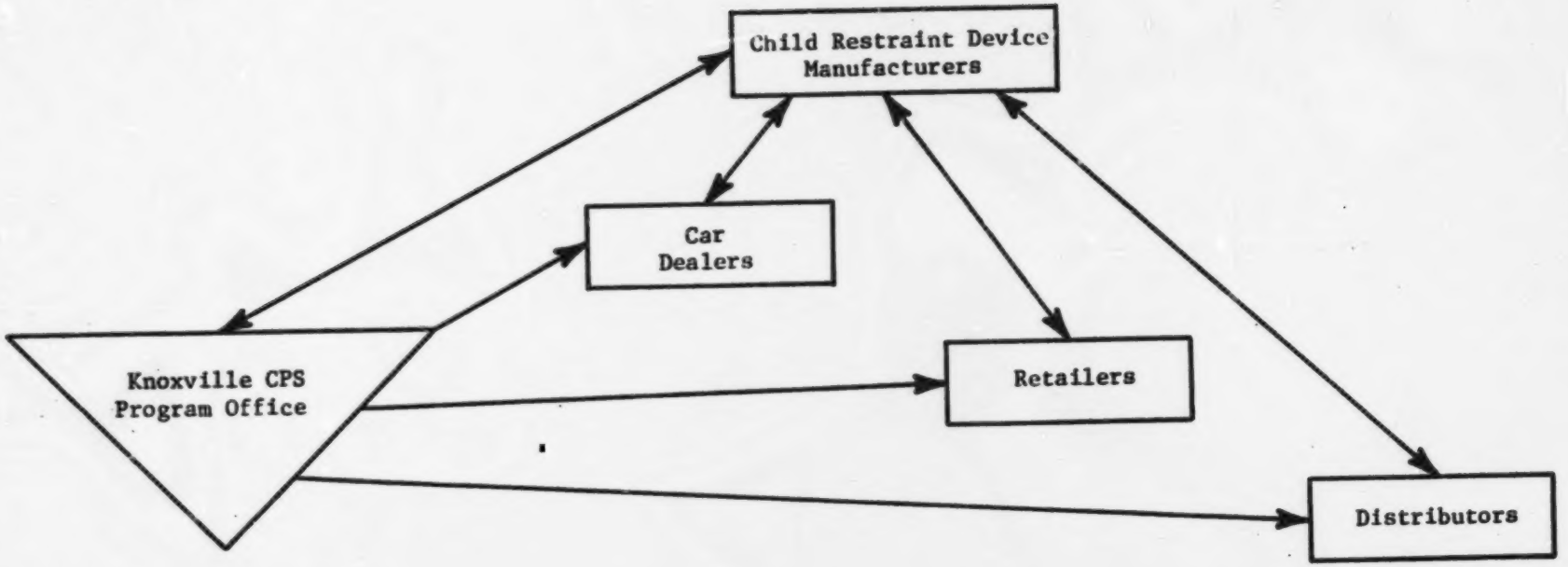


FIGURE III-5

SUPPLIERS OF CHILD RESTRAINT DEVICES

OCD will work closely with a person in the health field; a county health staff person will contact the county judge in her area; a highway safety educator will contact the doctor in his area.

It is appropriate to imagine all systems superimposed on each other and the chart showing a multi-dimensional model rather than a two-dimensional model. Any communication network is complex. Project personnel realize that the most effective communication exists between people who know each other. Therefore an attempt was made to develop the formal systems and to establish basic contacts so that as people began talking across network lines, it becomes easier to develop coordinated activities to promote child passenger safety in a particular area or community.

An important by-product of the combination of the general PI&E campaign and the personal contact with the many support groups is that the support groups themselves may become delivery groups (Figure III-6). The dynamics of this process are yet to be investigated, but it appears that the general PI&E campaign brings about a positive awareness of the CPS Program, which in turn gives individual CPS Program staff members more credibility when they make personal contact with officials of other agencies. Whatever the process, it is apparent that the current level of cooperation and support from other groups is much higher now than at the beginning of 1978. A number of these groups are initiating programs in behalf of child passenger safety.

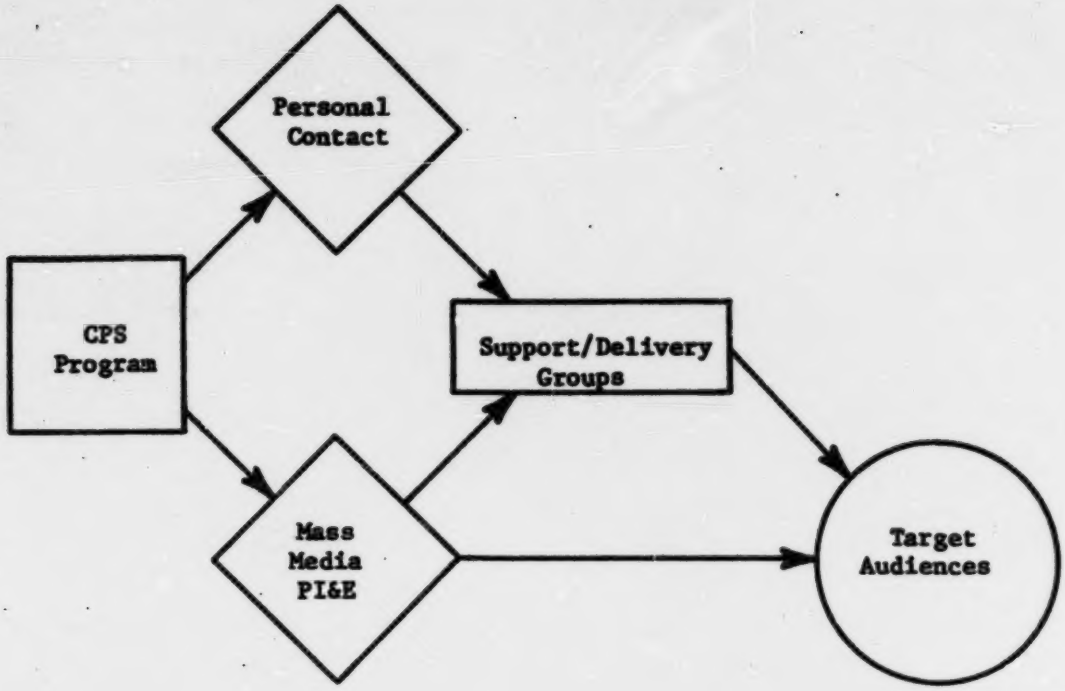
During its second quarter of operation, the CPS Program produced and distributed its second newsletter. This newsletter, the "CPSP Update" was a component of the PI&E effort and served as a means of informing other programs and groups of the progress of the CPS Program.

Requests for information also necessitated the development of a selection guide for purchasing CRDs. This guide lists the available devices on the market and their individual characteristics. An increasing number of these guides were requested by health officials, hospitals, doctors and private individuals.

Major businesses and industries in the comprehensive program areas were contacted to promote the CPS Program. Many industries have regular safety meetings, in-house newsletters, display areas or other activities as part of their company's safety program. Letters were sent to businesses and industries employing 500 or more persons. The letter explained the nature of the CPS Program and indicated that materials were available and that CPS staff were also available for presentations and meetings with employees on child passenger safety. Finally, as reported in more detail in the quarterly reports, numerous talks and audiovisual presentations were made before potential support groups in the hope of eliciting their support and cooperation.

Exchange of Information and Materials with Support Groups

In order to facilitate the exchange of information and materials with other state and national groups involved in child passenger safety, members of the CPS Program organized a National Child Passenger Safety Conference sponsored by the Transportation Center in cooperation with the Governor's Highway Safety Program and held in Nashville on May 10-12, 1978. This conference,



Support/Delivery Groups	Target Audiences
Church Groups	Parents
Businesses	Pre-parents (e.g., high school students)
Professional Groups	Prenatal Groups
Civil Groups	Preschoolers
Governmental Agencies	Relatives

FIGURE III-6

INVOLVEMENT OF SUPPORT/DELIVERY GROUPS

designed to be a working conference, involved its participants in the development of recommendations and goals for three main areas of child passenger safety--public information and education, research and legislation. Response to this conference was enthusiastic. Highway safety specialists, child development specialists, physicians, representatives from volunteer groups, CRD manufacturers and representatives from the local, state and federal governments attended. CPS Program members feel that this conference played a crucial role in developing and maintaining communication with public and private groups concerned with child passenger safety.

A consensus of opinion of those in attendance indicated that a national child passenger safety interest group should be established. The participants voted to make themselves the charter members of this group and asked the Transportation Center to coordinate the initial discussions. A ballot was developed for the election of a planning board. This ballot also served as a newsletter and reminder to conference participants of the goals and issues discussed at the meetings. Distribution of the ballot to conference participants and analysis of the returns has been accomplished.

The planning board met on December 13 in Washington, D.C. where the basic framework of the national association was prepared. A subcommittee of the group is working to prepare the by-laws.

The proceedings of the national conference are being prepared at this time. Copies of the proceedings should be available sometime during summer 1979.

All CRD manufacturers were invited to exhibit and participate in the National CPS Conference. The eight major manufacturers' exhibits were featured as the main event on the opening evening of the conference.

Public Information and Education with Respect to Enforcement

As mentioned previously, research related to seat belt usage has shown a strong link between enforcement and usage. The same appears to hold true for CRD usage. In Knoxville/Knox County, in-service training regarding the law was provided for the local law enforcement officers. Yet a check of local records indicated that fewer than ten citations were given by these officers over the past six months. Statewide, a survey of the number of citations given by the Tennessee Highway Patrol estimated that 53 people were cited. There is reason to believe that the estimate may be somewhat inflated. However, the administration of the Department of Safety will be changing in the first months of 1979, and it is hoped that the record of enforcement can be improved.

Piecemeal records also reveal that a number of cases have been dismissed in the courts. In all, it is clear that this is a weak link in the campaign for child passenger safety. In the next six months, the CPS Program staff plans to ask judges in Tennessee traffic courts to require violators of the law to purchase a CRD rather than to pay a fine and court costs. The CPS Program also plans to ask law enforcement officers (in a mailing to each individual) to do their parts in enforcing the law. This mailing also will solicit information about past performance and future intentions with respect to issuing citations for violations of the child passenger protection law. It

is hoped that this will lead to increased enforcement and, more importantly, to increased CRD usage.

Bleeding of Information

A partial list of activities that have seeped into basic state plan areas is given below. The impact of the bleeding is impossible to assess accurately, but it should be clear that that comparisons between the basic state plan and the comprehensive plan target areas are not the sharp contrast that had been planned. In practice, it appears that the comparison is between low-level comprehensive plans and high level comprehensive plans.

- Nashville received law passage publicity prior to baseline data collection.
- Dr. Bushore conducted seat belt campaign in Knoxville (pre-law and post-law) from August through November 1977.
- The range of television is wide. Nashville television PSAs were seen in Columbia. Knoxville PSAs were seen in Chattanooga, Tri-Cities and Morristown. Memphis PSAs were seen in Dyersburg.
- The Coach Meritt PSA was distributed early except in Knoxville (approximately February to March 1978).
- The Department of Health, Education and Welfare's radio PSAs were distributed in early October 1978.
- Television PSAs on automobile safety were distributed by the American Association of Oral and Maxillofacial Surgeons and by the Epilepsy Foundation.
- Displays were used early in Smyrna (affecting Columbia) and at the Green County Health Fair (affecting Tri-Cities and Morristown).
- The Memphis-Shelby County Health Department campaign began early.
- Newspaper circulation extends beyond target area boundaries.

Other States Considering Legislation*

It is apparent that child passenger safety is an important issue in the nation. Four states will be considering legislation on the subject soon. These are Connecticut, Massachusetts, Minnesota and Nebraska. Twelve other states possibly may have legislation introduced. These states are California, Florida, Indiana, Iowa, Maryland, Michigan, New York, North Carolina,

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*The sources for this information are: Bill Hall, Highway Safety Research Center, University of North Carolina, Chapel Hill, NC, (919) 933-2202; John Schaefer, Minnesota Safety Council, 145 Hamm Building, St. Paul, MN 55102, (612) 291-9150; and CPS Program files.

North Dakota, South Dakota, Washington and Wisconsin. All such states thus have become both markets and sources for PI&E ideas.

Special Note

Single copies of most of the PI&E materials, including transcripts of the radio and television PSAs, are available on request. Please write:

Child Passenger Safety Program
Transportation Center
The University of Tennessee
Knoxville, Tennessee 37916

PART IV

DATA COLLECTION, ANALYSIS AND INTERPRETATION

Data Collection

The data collected and used by the CPS Program may be divided into primary and secondary sources. The primary sources of information on CRD usage and attitudes come from the Tiers 1, 2 and 3 survey instruments. Data was collected under the direction of CPS Program. Secondary sources of information on CRD awareness levels and children's deaths and injuries come from surveys solicited by CPS Program and from records provided by the state.

Primary data collection is defined as the prefield preparation and infield procedures for obtaining Tier 1, 2 and 3 data. Data collection can be broken into four components: procedures and organization, training and manpower, logistics of data collection and data handling.

Procedures and Organization. To make the necessary usage analyses, three data collection tiers were used. The Tier 1 (Figure IV-I) was observational; Tier 2 (Figure IV-2) included a personal interview and self-administered questionnaire; and Tier 3 (Figure IV-3) involved a detailed mail-back questionnaire which the respondent could complete at home.

The Tier 1 instrument was designed for recording essential observed data in a matter of seconds. This level was performed at entrances to shopping centers, where small children might be transported by their parents or guardians. The data collected included: (1) the position of the child passenger estimated to be under four years of age; (2) driver's usage of seat belt; and (3) license plate number of vehicle for identification purposes. In addition to the above, a four-punch traffic counter was used to record: (1) the number of private passenger vehicles (excluding recreational vehicles of the truck or van type and trucks of one ton or greater); (2) the number of vehicles with CRDs (in use or not); (3) the number of drivers using seat belts; and (4) the number of times driver seat belt usage could not be determined. The Tier 1 instrument was designed to have data recorded for vehicles in which there were children estimated by the observer to be less than four years of age. License plate numbers were recorded for those vehicles and were matched with the next tier level.

Tier 2 was designed for gathering specific information about the child, the parent, the vehicle and the CRD if one was present or owned. Tier 2 information was collected by a combination of an interview by a trained interviewer and self-administered questions. The self-administered portion of Tier 2 was designed to collect demographic data on the person transporting the child under four years of age.

Tier 3 covers several specific areas including attitudes and knowledge of the law, opinions about CRDs and seat belts, CRD ownership, CRD usage and some standard demographics.

Child Passenger Safety Program

TIER 1

Data Sheet

1. Child(ren) under four years of age

Child #1	Other Child(ren)	
☐	☐	1. In CRD
☐	☐	2. Held by Passenger
☐	☐	3. Held by Driver
☐	☐	4. Other

2. Seat Belts in use (Driver Only)

☐ 1. Yes

☐ 2. No

☐ 3. Undetermined

3. License Number _____

Date _____ Code: ☐

FIGURE IV-1

TIER 1 DATA SHEET

FIGURE IV-2

TIER 2 DATA SHEET
(Reduced)

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Participation in this survey is completely voluntary. Only summary data will be reported. All individual responses will be confidential. You may withdraw your participation at any time. If you have any questions about the program you may call the Transportation Center 974-3253.

1. Do you (or your parent) own this car?

- ☐ 1. Yes
- ☐ 2. No

2. How many cars do you and your mate own?

- ☐ 1. One
- ☐ 2. Two
- ☐ 3. Three or more

3. Were you a driver and the passengers over 4 years of age wearing seat belts?

- ☐ 1. Yes, all were
- ☐ 2. Some passengers were
- ☐ 3. No, none were

4. What is your marital status?

- ☐ 1. Having/living with a mate
- ☐ 2. Single/living without a mate

5. How many children do you have?

Number living at home	Number not living at home	Children
a. _____	_____	Under 4 years
b. _____	_____	4-17 years
c. _____	_____	18 years or older

6. What was your family income last year before taxes? (If you are single/are living with a mate, what was your personal income?)

- ☐ 1. Less than $5,000
- ☐ 2. $5,000 to $9,999
- ☐ 3. $10,000 to $14,999
- ☐ 4. $15,000 to $19,999
- ☐ 5. $20,000 to $24,999
- ☐ 6. $25,000 to $29,999
- ☐ 7. $30,000 or more

7. What is your employment status? (Check only one)

- ☐ 1. Employed full time, outside home
- ☐ 2. Employed part time, outside home
- ☐ 3. Retired
- ☐ 4. Homemaker
- ☐ 5. Student
- ☐ 6. Unemployed
- ☐ 7. Other _____ (please specify)

8. What is your mate's employment status? (Check only one)

- ☐ 0. No mate
- ☐ 1. Employed full time, outside home
- ☐ 2. Employed part time, outside home
- ☐ 3. Retired
- ☐ 4. Homemaker
- ☐ 5. Student
- ☐ 6. Unemployed
- ☐ 7. Other _____ (please specify)

9. What is the highest level of education you have completed?

- ☐ 1. No formal schooling
- ☐ 2. Less than High School
- ☐ 3. High School or G.E.D.
- ☐ 4. Vocational or Technical School
- ☐ 5. Some college
- ☐ 6. College degree
- ☐ 7. Graduate degree

10. What is the highest level of education your mate has completed?

- ☐ 0. No mate
- ☐ 1. No formal schooling
- ☐ 2. Less than High School
- ☐ 3. High School or G.E.D.
- ☐ 4. Vocational or Technical School
- ☐ 5. Some college
- ☐ 6. College degree
- ☐ 7. Graduate degree

FIGURE IV-2 (Continued)

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Please indicate your response to the following statements by circling the number in the colum which most closely represents the extent to which you agree or disagree.

1.	Auto safety regulations infringe on individual rights.	1	2	3	4	5	6	7
2.	Seat belts interfere with driving.	1	2	3	4	5	6	7
3.	Seat belts are uncomfortable.	1	2	3	4	5	6	7
4.	There should be a Tennessee state law requiring drivers and passengers to wear seat belts.	1	2	3	4	5	6	7
5.	Seat belts are a lot of trouble to use.	1	2	3	4	5	6	7
6.	Seat belts are dangerous.	1	2	3	4	5	6	7
7.	Seat belts are as safe as child restraint devices for children between two and four years of age.	1	2	3	4	5	6	7
8.	The state of Tennessee should take a more active role in protecting children's welfare.	1	2	3	4	5	6	7
9.	A small child who is held by a passenger in a car is safe.	1	2	3	4	5	6	7
10.	Child restraint devices are difficult to switch from car to car.	1	2	3	4	5	6	7
11.	Children like to ride in child restraint devices.	1	2	3	4	5	6	7
12.	Older children are more willing than younger children to ride in child restraint devices.	1	2	3	4	5	6	7
13.	Child restraint devices take up a lot of room in the car.	1	2	3	4	5	6	7
14.	It is more trouble to put a child in a child restraint device than it is to hold the child while riding.	1	2	3	4	5	6	7
15.	Parents are more likely to use a child restraint device when driving over 40 m.p.h. than when driving more slowly.	1	2	3	4	5	6	7
16.	Most child restraint devices are comfortable for children.	1	2	3	4	5	6	7
17.	Children are more trouble when riding in child restraint devices than when not riding in child restraint devices.	1	2	3	4	5	6	7
18.	Mothers are more likely than fathers to secure their children in child restraint devices.	1	2	3	4	5	6	7
19.	Children are more likely to fight with one another when they are not seated in restraint devices.	1	2	3	4	5	6	7
20.	Children resist riding in child restraint devices when there are other passengers in the car.	1	2	3	4	5	6	7
21.	Child restraint devices are a lot of trouble to use.	1	2	3	4	5	6	7
22.	Child restraint devices are too expensive.	1	2	3	4	5	6	7
23.	A parent is more likely to use a child restraint device when there is no one else in the car.	1	2	3	4	5	6	7
24.	Parents are more likely to use a child restraint device when driving long distances than when driving short distances.	1	2	3	4	5	6	7
25.	Child restraint devices are inconvenient to use.	1	2	3	4	5	6	7
26.	Child restraint devices are difficult to install.	1	2	3	4	5	6	7
27.	Parents should make their child ride in a child restraint device.	1	2	3	4	5	6	7
28.	A child's willingness to ride in a child restraint device increases with regular use.	1	2	3	4	5	6	7
29.	Children resist riding in child restraint devices.	1	2	3	4	5	6	7
30.	Instructions that come with child restraint devices are easy to follow.	1	2	3	4	5	6	7

FIGURE IV-3

TIER 3 QUESTIONNAIRE
(Reduced)

31. Have you heard of the Tennessee Child Passenger Protection Act (often called Child Restraint Law)?

☐ 1. Yes

☐ 2. No (If No, Skip to Question 35.)

32. Indicate whether you think the following statements about the law are true or false by circling the number in the appropriate column.

	True	False
a. The law applies to anyone transporting children.	1	2
b. Children are to be secured in federally approved child restraint devices.	1	2
c. Children can be placed in seat belts as a substitute for child restraint devices.	1	2
d. Passengers can hold children as a substitute for child restraint devices.	1	2
e. The law carries a penalty of a fine.	1	2
f. Children riding in a recreational vehicle such as a van or truck do not have to be placed in child restraint devices.	1	2
g. The law applies only to children under four years of age.	1	2

33. (a) Where did you receive information about the law? Circle the number in the appropriate column.

	Yes	No
1. From the newspaper.	1	2
2. From television.	1	2
3. From radio.	1	2
4. From a billboard.	1	2
5. From a club or organization.	1	2
6. From your doctor's office.	1	2
7. From a pamphlet or brochure.	1	2
8. From a friend.	1	2
9. From a school program.	1	2
10. From a hospital.	1	2
11. From where you work.	1	2
12. Other (Please specify) _____		

(b) Underline the source above which was most informative (example, From radio).

34. Please indicate your response to the following statements by circling the number in the column which most closely represents the extent to which you agree or disagree.

	STRONGLY AGREE			NEUTRAL			STRONGLY DISAGREE
a. A child passenger protection law makes parents more likely to secure their child in a child restraint device.	1	2	3	4	5	6	7
b. Parents are more aware of the safety needs of children in cars since learning about the law.	1	2	3	4	5	6	7
c. Parents will not use a child restraint device unless there is a fine for violating the law.	1	2	3	4	5	6	7
d. Parents will comply with the child passenger protection law only if it is strictly enforced.	1	2	3	4	5	6	7
e. A child passenger protection law is necessary to protect children who are too young to protect themselves.	1	2	3	4	5	6	7

FIGURE IV-3 (Continued)

35. Do you own a child restraint device?

☐ 1. Yes (If yes, skip to question 37)
☐ 2. No

36. Why do you NOT own a child restraint device? (Check (✓) all the reasons that apply.)

☐ a. I did not know they were available.
☐ b. They are too expensive.
☐ c. My child does not like them.
☐ d. I have not gotten around to getting one.
☐ e. They are too difficult to install.
☐ f. They are too much trouble to use.
☐ g. They take up too much room in the car
☐ h. I use a seat belt with my child.
☐ i. I did not realize my child needed one.
☐ j. Other _____
(Please specify.)

If you DO NOT OWN a child restraint device, skip to question 40.

37. a) How many child restraint devices (CRD) do you own? (Circle the appropriate number.)

1 2 3

b) How did you obtain the child restraint device(s) that you are currently using? (Check (✓) the appropriate item.)

CRD #1	CRD #2(if more than one)	
☐	☐	1. Purchased from a car dealer.
☐	☐	2. Purchased at a department, discount, or children's specialty store.
☐	☐	3. Purchased second hand.
☐	☐	4. Received second hand from a friend or relative.
☐	☐	5. Received a new one as a gift.
☐	☐	6. Received on loan from an organization.
☐	☐	7. Other _____ (Please specify)

c) Approximately how many months have you had the child restraint device(s)?

CRD #1 _____ CRD #2 _____

d) Approximately how many months old was your child when you first began using the child restraint device(s)?

CRD #1 _____ CRD #2 _____

38. Out of the last five short trips you took with your child (trip time about 30 minutes or less), how many times did you use a child restraint device with your child?

0 1 2 3 4 5

39. Out of the last five long trips you took with your child (trip time one hour or more), how many times did you use a child restraint device with your child?

0 1 2 3 4 5

40. Out of the last five short trips you took with your child (trip time about 30 minutes or less), how many times did you use your seat belt?

0 1 2 3 4 5

41. Out of the last five long trips you took with your child (trip time one hour or more), how many times did you use your seat belt?

0 1 2 3 4 5

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FIGURE IV-3 (Continued)

42. Were you the driver of the car when you received this questionnaire?

- ☐ 1. Yes
- ☐ 2. No

43. What is your age? ____

44. What is your sex?

- ☐ 1. Male
- ☐ 2. Female

45. Please list your occupation and employer and your spouse's occupation and employer. If not presently employed, check (✓) unemployed.

YOURSELF	YOUR SPOUSE
a. Occupation _____	a. Occupation _____
b. Employer: _____	b. Employer _____
c. Unemployed ☐	c. Unemployed ☐

46. What was your total family income last year before taxes?

- ☐ 1. Less than $5,000
- ☐ 2. $5,000 to $9,999
- ☐ 3. $10,000 to $14,999
- ☐ 4. $15,000 to $19,999
- ☐ 5. $20,000 to $24,999
- ☐ 6. $25,000 to $29,000
- ☐ 7. $30,000 or more

47. From youngest to oldest, please indicate the sex and birthdate of your children. Please also indicate whether or not they are currently living in your household. (If you have more than eight children, please list the eight youngest.)

	SEX		BIRTHDATE Month - Year	LIVING AT HOME?	
Child #1	☐ Female	☐ Male	☐☐ - ☐☐	☐ Yes	☐ No
Child #2	☐ Female	☐ Male	☐☐ - ☐☐	☐ Yes	☐ No
Child #3	☐ Female	☐ Male	☐☐ - ☐☐	☐ Yes	☐ No
Child #4	☐ Female	☐ Male	☐☐ - ☐☐	☐ Yes	☐ No
Child #5	☐ Female	☐ Male	☐☐ - ☐☐	☐ Yes	☐ No
Child #6	☐ Female	☐ Male	☐☐ - ☐☐	☐ Yes	☐ No
Child #7	☐ Female	☐ Male	☐☐ - ☐☐	☐ Yes	☐ No
Child #8	☐ Female	☐ Male	☐☐ - ☐☐	☐ Yes	☐ No

If you would like for us to send your child the free story booklet explaining child restraint devices and why children need them, please list the following information:

Child's name: _____

Mailing address: _____

_____

_____

Date: _____ Code: ☐

FIGURE IV-3 (Continued)

The tier data was collected at shopping centers in eight cities. Shopping centers were chosen as data collection sites because of the large number of parents who shop with small children and because of the likelihood of obtaining a representative cross section of socioeconomic levels within each target area. The target areas and their respective data collection sites are listed below.

Knoxville

- West Town Mall
- Broadway Shopping Center
- King's Plaza
- Clinton Plaza
- Zayre's

Nashville

- Farmer's Market
- Green Hills Shopping Center
- Sear's Madison
- Service Merchandise

Chattanooga

- Golden Gateway
- Highland Plaza
- Brainerd Village
- East Ridge Center

Tri-Cities

- Kingsport (Fort Henry Mall)
- Johnson City (Miracle Mall)
- Bristol (Hills Shopping Center)

Memphis

- Parkway Village
- Lemar Avenue Treasury
- Eastgate

Rural Areas

- Morristown
  - Morristown Plaza
- Columbia
  - Murray County Mall
  - Northway Shop
- Dyersburg
  - Dyersburg Square
  - Green Village

A description of the procedure for collecting the Tier 1, 2 and 3 data is summarized in Figure IV-4. The basic procedure involves two kinds of fieldworkers who communicate with two-way radios. "Observers" are posted at shopping center entrances and collect counter and Tier 1 data. When an eligible car enters the parking lot, the observers record the counter and Tier 1 data, then radio to "Interviewers" and inform them of the eligible car's presence and direction. The interviewers are located throughout the shopping center's parking lot and track the eligible vehicle until it parks, whereupon the closest interviewer approaches the vehicle to collect the Tier 2 data and to distribute the Tier 3 questionnaire. Generally, the interviewers are female in order to reduce possible reactivity of drivers to being approached by a strange man. Observers are usually men.

Data collection occurs at each shopping center site until preset quotas are reached for numbers of Tier 1 and 2 observations. Large shopping centers often require as much as two days active collection done on Saturdays from 10 a.m. to 6 p.m. and Sundays from 1 a.m. to 6 p.m. Smaller centers can be completed in an afternoon; sometimes Fridays are used for small sites.

While in the field, observers and interviewers wear bright orange tunics and University of Tennessee nametags. In addition, each is equipped with a low powered two-way "walkie talkie" to communicate with the other observers and interviewers. Due to the outdoor nature of the data collection, working

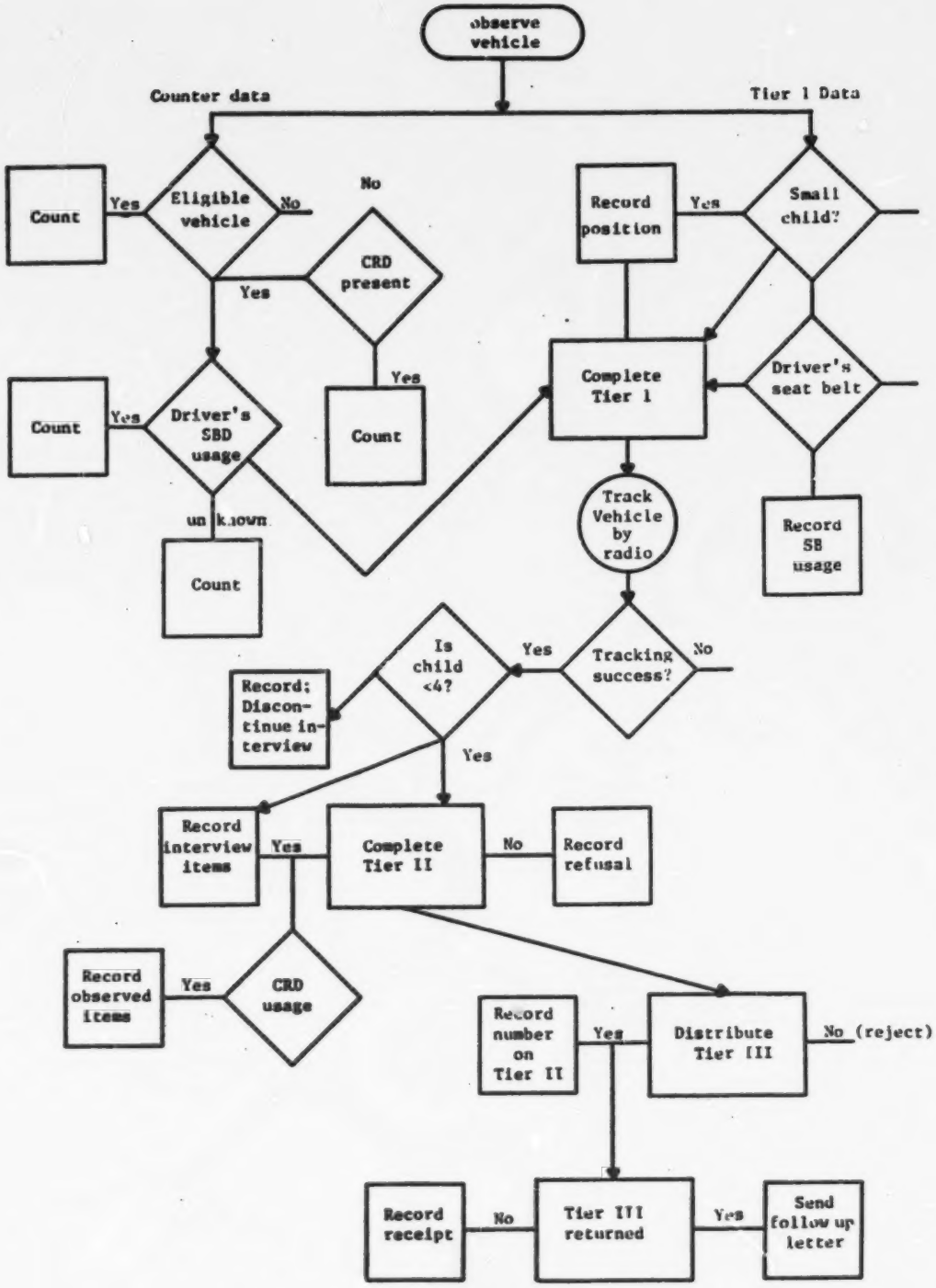

FIGURE IV-4

USAGE DATA COLLECTION FLOW CHART

conditions can range from cold and/or wet weather to hot and sunny weather. This has an important influence on worker fatigue and on the entire data collection process. A data collection crew for a small shopping center numbers about eight to ten people.

Each shopping center site is run by a CPS Program staff supervisor who manages the day's activities including: (a) site start-up and equipment/materials distribution; (b) continuous collection of Tier 1 and 2 forms from fieldworkers and check of their accuracy; (c) "fighting fires," i.e., keeping the procedure going despite weather conditions and equipment malfunctions; (d) handling the fieldworkers time cards and other payroll details; and (e) preparing a Daily Talley Summary of the day's quantitative data volume.

Training and Manpower. The 25 data collection sites in eight cities pose considerable manpower requirements for the Tier 1, 2, 3 data collection. Approximately 250 fieldworkers are trained in groups of approximately 30 over a period of five weeks. The fieldworkers are recruited primarily at college campuses located in each of the target cities. Recruiting is done on campus by posters and through student employment offices. The fieldworkers are predominantly college students, approximately 60 percent are female, most are 18 to 25 years of age and all are paid $3.00 an hour for their training and work time.

The trainers for the training sessions are CPS Program staff members and experienced site supervisors. The training session uses a variety of techniques (films, slide program, printed procedures/instructions and simulation practice) to impart skills and knowledge to fieldworkers on CRDs and auto safety, procedures for systematic observation and interviewing, two-way radio operation and filling out data forms.

The settings for the training sessions are generally classrooms on the college campus where fieldworkers were recruited. The session lasts for approximately two hours and takes place on the Thursday or Friday evening prior to the weekend of data collection.

Logistics of Data Collection. This component of data collection deals with the prefield preparations necessary to ensure the success of each operation period's data collection. First and foremost, the shopping center managers must be contacted, and permission must be obtained to collect data on the given dates. Permission should be obtained in writing. This written confirmation is used by site supervisors in case verification is necessary in the field.

Second, in each target city, local people are contacted and provided with materials and posters for the fieldworker recruiting activities. Arrangements are made for a training location. The recruiting activities are crucial to ensure that there are sufficient numbers of trainees waiting at the designated training site for the trainer who only arrives in town the same day as training. In cases where recruiting is inadequate or unsuccessful, workers may be obtained from temporary employment agencies, but this does involve an increase in labor costs.

Third, for each target area there are considerable equipment and materials preparations which must be organized, including training materials. The following checklist gives some idea as to the time and effort necessary to prepare for data collection as well as to sort out the same materials upon return from the field.

CHECKLIST

Data Collection

1. Data collection notebook
2. Tier 1 forms
3. Tier 2 forms proper numbers
4. Tier 3 forms
5. Walkie talkies (batteries checked)
6. Tunics
7. Nametags
8. Pens/pencils
9. Traffic counters
10. Clipboards
11. Reference cards
12. Balloons
13. Date stamps
14. Code stamps
15. Stamp pads
16. Extra batteries
17. Signs
18. Rubber bands
19. Tape
20. Scissors
21. Coke crates
22. Thermos jugs
23. Time sheets
24. Personnel papers
25. Thumb tacks
26. Marking pens
27. Paper clips
28. Scratch pads

(Optional)

29. Hot chocolate mix
30. Cups
31. Spoons
32. Gloves and knit hats

Training Materials

1. Slides
2. Slide projector
3. Pointer
4. Training Packets:
   - instructions for Tier 1
   - instructions for Tier 2
   - time sheets
   - personnel papers
   - W-4 forms
   - work applications
   - reference sheets
5. Sample Tier 1 forms
6. Sample Tier 2 forms
7. Sample Tier 3 forms
8. Pens/pencils
9. Nametags
10. Guidelines for trainers
11. One tunic

Finally, hotel accomodations for trainers and supervisors must be arranged in addition to transportation for both personnel and equipment.

Data Handling. This last component of data collection is concerned with the post field preparation and transformation of the raw Tier 1, 2 and 3 data into a computer format suitable for electronic data processing and analysis. Figure IV-5 is a flow chart which summarizes the steps of data handling which are necessary to ensure accurate, error free transformation of raw data to

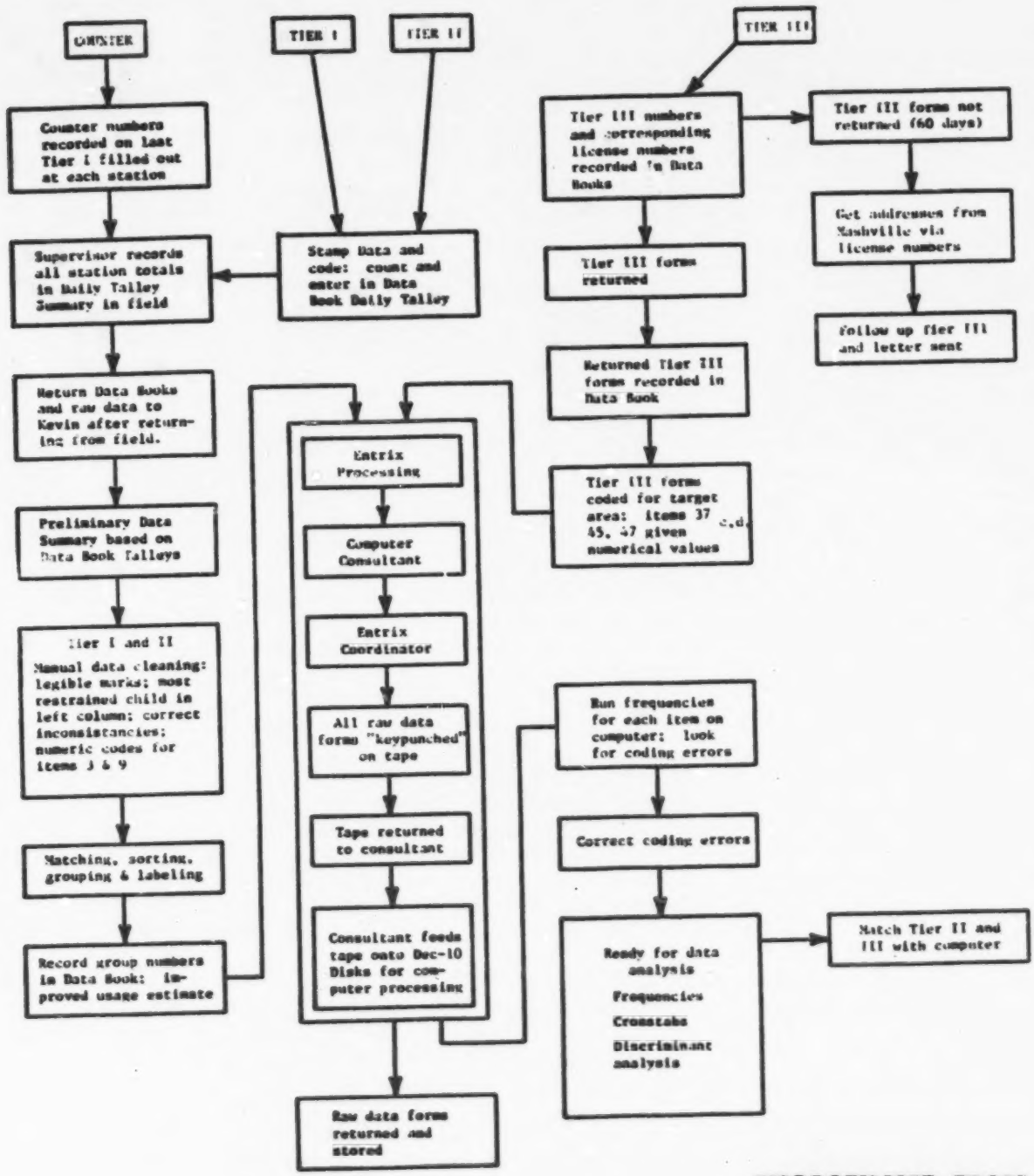
CENTER
TIER I
TIER II
TIER III
Counter numbers recorded on last Tier I filled out at each station
Stamp Data and code: count and enter in Data Book Daily Tally
Supervisor records all station totals in Daily Tally Summary in field
Tier III numbers and corresponding license numbers recorded in Data Books
Tier III forms not returned (60 days)
Get addresses from Nashville via license numbers
Follow up tier III and letter sent
Tier III forms returned
Returned Tier III forms recorded in Data Book
Tier III forms coded for target area: items 37 and 45, 47 given numerical values
Return Data Books and raw data to Kevin after returning from field.
Preliminary Data Summary based on Data Book Tallys
Tier I and II
Manual data cleaning: legible marks; most restrained child in left column; correct inconsistancies; numeric codes for items 3 & 9
Matching, sorting, grouping & labeling
Record group numbers in Data Book: improved usage estimate
Entrix Processing
Computer Consultant
Entrix Coordinator
All raw data forms "keypunched" on tape
Tape returned to consultant
Consultant feeds tape onto Dec-10 Disks for computer processing
Raw data forms returned and stored
Run frequencies for each item on computer: look for coding errors
Correct coding errors
Ready for data analysis
Frequencies
Crosstabs
Discriminant analysis
Match Tier II and III with computer

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FIGURE IV-5

DATA HANDLING FLOW CHART

computer format. It should be noted that considerable person hours are required to check, date, code and match approximately 3000 Tier 1, 1500 Tier 2 and 500 Tier 3 forms which are transformed into computer format for each data collection period.

There are four kinds of data obtained from the field: counter, Tier 1 Tier 2 and Tier 3. The counter data and quantities of Tier 1 and Tier 2 forms are recorded on the Daily Talley Summary by the site supervisor. The Tier 1 and Tier 2 forms must be coded for the date and place where collected. Tier 1 forms are separated into in-state and out-of-state, and the CRD usage of each is recorded on the Daily Talley Summary. Tier 2 forms also are separated, and the CRD usage rate is recorded, but out-of-state forms are discarded. These figures constitute the preliminary data summary.

Next, the Tier 1 and 2 forms are checked manually for obvious recording errors and are corrected. Numerical codes for particular items are added to facilitate computer entry. All possible Tier 1 and 2 forms are matched by license number and then are sorted into five groups: T1ONLY (Tier 1 only); T2ONLY (Tier 2 only); T12MCH (matched Tiers 1 and 2); T1REF2 (Tier 1, Tier 2 refused); and T12GE4 (matched Tiers 1 and 2, child four or older). At this point the bundled groups of raw data forms are sent to the University of Tennessee computer center to be put into the Entrix data entry process and then onto disk storage for use on the DEC-10 system.

Also obtained from the Tier 2 forms are the license numbers of the car to which the corresponding Tier 3 was given. These license numbers and the Tier 3 numbers are recorded. If no Tier 3 response is received within a month, the addresses of these Tier 3 vehicles are obtained from the Tennessee Department of Safety, and a follow-up letter and questionnaire are sent to each address requesting that it be filled out and returned. As an incentive, those completing the Tier 3 questionnaire are sent the safety-oriented children's book, "For Pete's Sake!"

A last check on the Tier 1, 2 and 3 data is necessary to catch field-worker, coding or computer entry errors which remain. After manual cleaning, computer runs of item value frequencies are executed to search for illogical values. If and when these errors are found, they are corrected. The data then is ready for data analysis.

Data Analysis and Interpretation

Using the Tier 2 data from the baseline and first operational periods, a number of measures were found to be related significantly to CRD usage for both periods. These results are found in Table IV-1. Some of the variables that are listed are important only indirectly (i.e., they may be related to a good predictor of CRD usage). Another variable contained redundant information, and education of the respondent was preferred to that of the mate. Additional analyses were performed in order to arrive at a parsimonious set of characteristics of CRD users and nonusers.

A two-group (user/nonuser) discriminant analysis was performed using those nonredundant variables that could be said to have a linear relationship with CRD usage. Both the baseline and the first operational analyses yielded the same set of predictors at the seventh step (Table IV-2). These predictors

TABLE IV-1

LIST OF SIGNIFICANT VARIABLES

Variable	Significance Level	
	Baseline	Operational
Family Income	<0.001	<0.001
Educational Attainment of Respondent	<0.001	<0.001
Educational Attainment of Respondent's Mate	<0.001	<0.001
Age of Child (Child #1)	<0.001	<0.001
Vehicle Ownership	<0.001	<0.001
Number of Vehicles Owned	<0.001	0.041
Number of Adults in Vehicle	0.008	0.001
Employment Status of Respondent (categorical)	0.001	0.001
Marital Status	0.018	0.001
Year of Vehicle	0.05	0.033
Driver Relationship to Child (Child #1)	0.001	0.010
Seat Belt Usage of Passenger Other than Small Children	0.001	0.001

TABLE IV-2

RESULTS OF DISCRIMINANT ANALYSIS

Overall Test on the Set of Six Variables			F Ratios Baseline 31.3	Operational 24.7
Conditional Test on Each Variable	**Rank Order of Importance**		**Semi-Partial F Ratios**	
	Baseline	**Operational**	**Baseline**	**Operational**
Seat Belt Usage of Passengers in Vehicle with Child	1	1	141.8	120.8
Educational Attainment of Respondent	2	2	30.3	23.2
Number of Adults in Vehicle	3	3	17.3	12.4
Age of Child (Child #1)	4	4	14.1	6.0
Driver Relationship to Child (Child #1)	5	7	5.1	0.2
Family Income	6	6	2.9	1.4
Ownership of Vehicles	7	5	1.4	4.1

are seat belt usage, education, income, number of adults in the vehicle, age of child, driver relationship to the child and vehicle ownership. These appear to be the most important determinants of CRD usgae.

Partial correlations were run to determine the nature of the relationships that some of the less important variables have with CRD usage. The results can be seen in Table IV-3. The number of vehicles owned and the year of the vehicle apparently are related to socioeconomic status (as measured by income and education) and so are only indirectly related to CRD usage. Marital status tends to be a subset of parental status and so is a less effective indicator of CRD usage. A dichotomized version of employment status was found to be somewhat a function of socioeconomic status. None of the variables in Table IV-3 were considered to be related directly to CRD usage over both periods.

These results allow us to give the following profile of user characteristics by topic heading:

CRD Users Tend to:	Topic Heading
• Wear their seat belts	safety consciousness
• Have more education	socioeconomic status
• Have higher incomes	socioeconomic status
• Have fewer adults in vehicle	situation
• Be transporting infants	situation
• Be the parent of the child	legal responsibility
• Be the owner of the vehicle	legal responsibility

It is felt that these characteristics provide the essential contrasts between the CRD user and nonuser groups.

The Tier 3 frequencies for the baseline and first operational periods have been translated into percentages and were reported in the Quarterly Report for July 1, 1978 to September 30, 1978. Respondents to the Tier 3 questionnaire claim a higher CRD ownership rate (73-86%) than was observed in the general sample (53-64%), so the results represent a biased response (pro-CRD). Nonetheless, attitudes toward CRD usage are revealing:

- About 50 percent of the respondents say that CRDs are too expensive.
- About 50 percent of the respondents indicate that their children do not like to ride in CRDs.
- Nearly 50 percent of the respondents report that CRDs take up too much room in their cars.
- Between 43 and 52 percent of the respondents say that their children resist riding in CRDs.

TABLE IV-3

PARTIAL CORRELATIONS WITH CRD USAGE

Control for Effect of:	Variable	Partial Correlation with CRD Usage	
		Baseline	First Operational
SES (Income and Education)	No. of Vehicles Owned	.0391 (.047)	.0040 (ns)
SES (Income and Education)	Year of Vehicle	.0222 (ns)	.0034 (ns)
SES (Income and Education)	Employment Status	.0029 (ns)	.0788 (.002)
Driver Relationship to the Child	Marital Status	.0325 (ns)	.0823 (.001)

These same attitudes are observed whether or not the respondent owns a CRD. The attitudes apparently reflect some of the major concerns in the target population.

CRD usage rates are shown in Table IV-4. They show a drop in usage for four of the six target areas. Memphis, which started slowly, is still showing an increase in CRD usage. The increase in usage in Knoxville is also gratifying because it coincides with an increase in awareness as measured in the telephone survey. Finally, it is clear that the three top rates in the second observational period are associated with the three areas receiving the comprehensive plan.

Much of the analysis of the baseline data has been reported in the quarterly reports of 1978. The analysis of the second operational data is as yet incomplete. However, the results for the baseline, first operational and second operational data sets appear to show very similar trends. For these reasons, the analysis of the first operational data set was chosen as representative. The data are reported in Appendices A, B and C.

The annual survey of CRD manufacturers will be completed in the first months of 1979. Preliminary indications from retailers and sales representatives of CRD manufacturers indicate that sales have continued to increase substantially (Table IV-5).

The survey of fatalities and injuries suffered by child passengers continues to be plagued by one critical problem--inaccurate data. Also, state agencies, working from the same basic data set, may provide substantially different statistics. However, through the auspices of the Tennessee Governor's Highway Safety Program, a more reliable report on the number of facilities for children under age four has emerged, as shown below:

Year	# Fatalities (children < 4)
1975	17
1976	13
1977	16
1978	17

There has been no reduction in the reported number of fatalities due to the law and the CPS Program. However, it can be said that during the year there were three incidents reported where potential fatalities were avoided by the use of CRDs.

No reliable reports on the number of injuries has been found, and no trustworthy summary can be provided until the discrepancies can be resolved. It should be noted that the survey of hospital and physician records (Table IV-6) is a voluntary report, and a decline in the number of responses over time was observed. A request to all the participants asking for their continued support and interest has resulted in an increase in the number of responses, at least for the present. The data that are available indicate a decline in the serious injury rate.

TABLE IV-4

CRD USAGE RATES[a]

Target Area	Baseline	First Operational	Second Operational
Nashville	14.0	22.1 (CP)	19.0 (CP)
Memphis	10.9	13.5 (BSP)	16.5 (CP)
Knoxville	12.8	20.4 (BSP)	22.3 (CP)
Chattanooga	10.9	16.5 (BSP)	9.2 (BSP)
Tri-Cities	10.7	17.9 (BSP)	15.1 (BSP)
Urban Average[b]	11.8	18.3	17.0
"Rural"	6.5	12.5 (BSP)	9.7 (BSP)
Statewide Estimates[c]	9.2	15.4	13.4
		1978 Annual Rate ~ 14.4	

a. Final figures; based on combined Tier 1 and Tier 2 observations.

b. Weight according to sample size.

c. Estimate = ½ (Rural + Urban Average)

BSP = Basic State Plan

CP = Comprehensive Plan

TABLE IV-5

CRD AVAILABILITY IN TENNESSEE

Manufacturer	Number Distributed			
	1975	1976	1977	1978[a]
Collier-Keyworth: "Bobby-Mac"	2852	2356	3588	3600
Strollee: "Wee Care Car Kit"	1177	2520	4150	15431
Pride-Trimble: "Dynamic Care" Seat	219	250	220	300
AC Delco: GM "Love Seat"[b]	168	376	7783	9500
Questor: "Kantwet/Infanseat"	880	1000	1677	1800
Ford: "Infant Carrier/Tot-Guard"	169	113	80	67
Hedstrom: "Positest" Car Seat	90	135	180	225
Chrysler: "Mopar Infant Safety Carrier/ Mopar Child Seat"[a]	50[a]	75[a]	100[a]	125[a]
International MFG.: "Teddy-Tot"	1000	2167	2427	2500
Peterson: "Safety Shell"	1320	2246	2471	2500
Century: "Trav-L-Guard"	25	50	144	565
All Others	50[a]	75[a]	100[a]	125[a]
TOTALS	8,000	11,390	22,920	36,738

[a]Preliminary estimates.

[b]1975, 1976 figures reflect GM distribution to dealers only. In 1977, GM expanded its distribution to include organizations other than dealers.

TABLE IV-6

PERCENT OF SERIOUS INJURIES AMONG THOSE REPORTED
(child passengers under 4 years old)

	Baseline Nov-Dec '77	Jan-June '78	July-Dec '78
Doctor's Reports	a	22.2	7.4
Hospital Reports	19.0	16.9	13.9

[a]Small sample, n = 5, indicated a 20 percent serious injury rate.

Recently another source of data has become available which provides information on child restraint and injury to children under four who were involved in traffic accidents during 1978. The Traffic Accident Report Supplement (child restraint survey) to the Tennessee Officers Accident Report is supposed to be completed for motor vehicle accidents involving children under four years of age. Although this supplement has not been filled out consistently, the present sample includes information on 420 children who were involved in 366 traffic accidents. The supplement provides data on child injury and its relation with CRD usage. Additionally, this data source has provided convergent validation of several other aspects of CRD usage obtained from the Tier 1 and Tier 2 measures. These data indicate that children riding in CRDs have 46 percent fewer serious injuries/fatalities than their counterparts riding without CRDs (see Table IV-7).

A telephone survey plan was drawn up with the objective being to determine public awareness of the law (Table IV-8). In particular, the plan calls for pre-comprehensive plan measures, then some post-comprehensive plan measures at intervals of 6, 12, 18 and 24 months in selected target areas. The results to date, albeit inflated, indicate that public awareness of the law is about nine percent higher after the first six months of the comprehensive plan. These results are shown in Table IV-9. Among the general population, awareness rates range from 52 to 67 percent; among parents of children under four yeras of age, the rates are in the 70 to 99 percent range.

TABLE IV-7

STATE OF PREPAREDNESS VS. EXTENT OF INJURY

State of Preparedness	Extent of Injury		
	None	Minor	Serious/Fatal
CRD Used	69.6%	25.9%	4.5%
No Restraint	53.7%	38.0%	8.3%

Source: Traffic Accident Supplement Form

TABLE IV-8

TELEPHONE SURVEY PLAN

	Jan 78	Jul 78	Jan 79	Jul 79	Jan 80	Jul 80
Nashville	E CP	T			T →	
Knoxville	BSP	T CP	T	T	T →	
Memphis	BSP	T CP+LP	T		T →	
Rural (Morristown)	BSP	BSP	T CP		T →	
Chattanooga	BSP	BSP	T CP+LP		T →	
Tri-cities	BSP	BSP	BSP	T CP	T →	

T = telephone survey
E = estimated
LP = Loaner Program
CP = Comprehensive Plan
BSP = Basic State Plan

TABLE IV-9

AWARENESS OF THE LAW

	Collection Periods			
	Before CP		Six Months CP	
	G(%)	P(%)	G(%)	P(%)
Nashville	67[a]	86[a]	77	93
Knoxville	62	84	70	99
Memphis	63	87	73	92
Morristown	67	85		
Chattanooga	52	70		

[a]Estimated

CP = Comprehensive Plan;
G = General population;
P = Parents of children under four years of age.

PART V

SUMMARY

The basic state PI&E plan is functioning well and is generating a high demand for brochures and posters. The comprehensive PI&E plan also has demonstrated its value by sustaining CRD usage rates well above the baseline for an extended period. Awareness rates are high, and CRD sales are estimated to be substantially higher in 1978 compared to previous years.

Community contacts and commitments are increasing, and the film and the portable exhibits continue to get extensive use. The number of newspaper and magazine articles demonstrates an abiding interest in child passenger safety throughout the state.

The data analyses have provided a clear profile of CRD user and nonuser characteristics as well as perceptions of the reasons for nonuse. It is clear that an educational campaign to raise the general level of safety consciousness would benefit the CRD campaign. It also appears that the loaner program in Memphis, because of the publicity it engendered, improved usage rates for all levels of income. And it seems that some CRD design problems exist. CRDs somehow must be made to satisfy American concepts of comfort and convenience so that a higher percentage of those that are purchased will be used.

Finally, it appears that one essential ingredient is preventing an upsurge in CRD usage rates, i.e., enforcement. Law enforcement is perceived as the key to a continued successful program. No enforcement is equivalent to no law; and persuasion is not enough--witness the campaign to get Americans to wear seat belts. The CPS Program staff will redouble its efforts to get the law enforced to the fullest extent possible.

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APPENDIX A

DETAILED ANALYSIS OF FIRST OPERATIONAL PERIOD RESTRAINT USAGE DATA

The restraint usage data collected after the law and the PI&E program were operational for a period of approximately six months were analyzed. The analysis of the first operational period restraint usage data included making comparisons to data collected during the baseline period. These comparisons were made to point out similarities and differences between the two periods.

Comparison of First Operational Period and Baseline Period Samples and Selected Population Characteristics

The purpose of comparing the collected sample data with established data for the population is to determine how well the sample represents the population. There were only two variables which seemed to be critical with regard to population sampling. Because family income and educational attainment are variables which often affect many other variables, it was desirable to obtain a cross-sectional sample which represented the averages for each category designated for these variables.

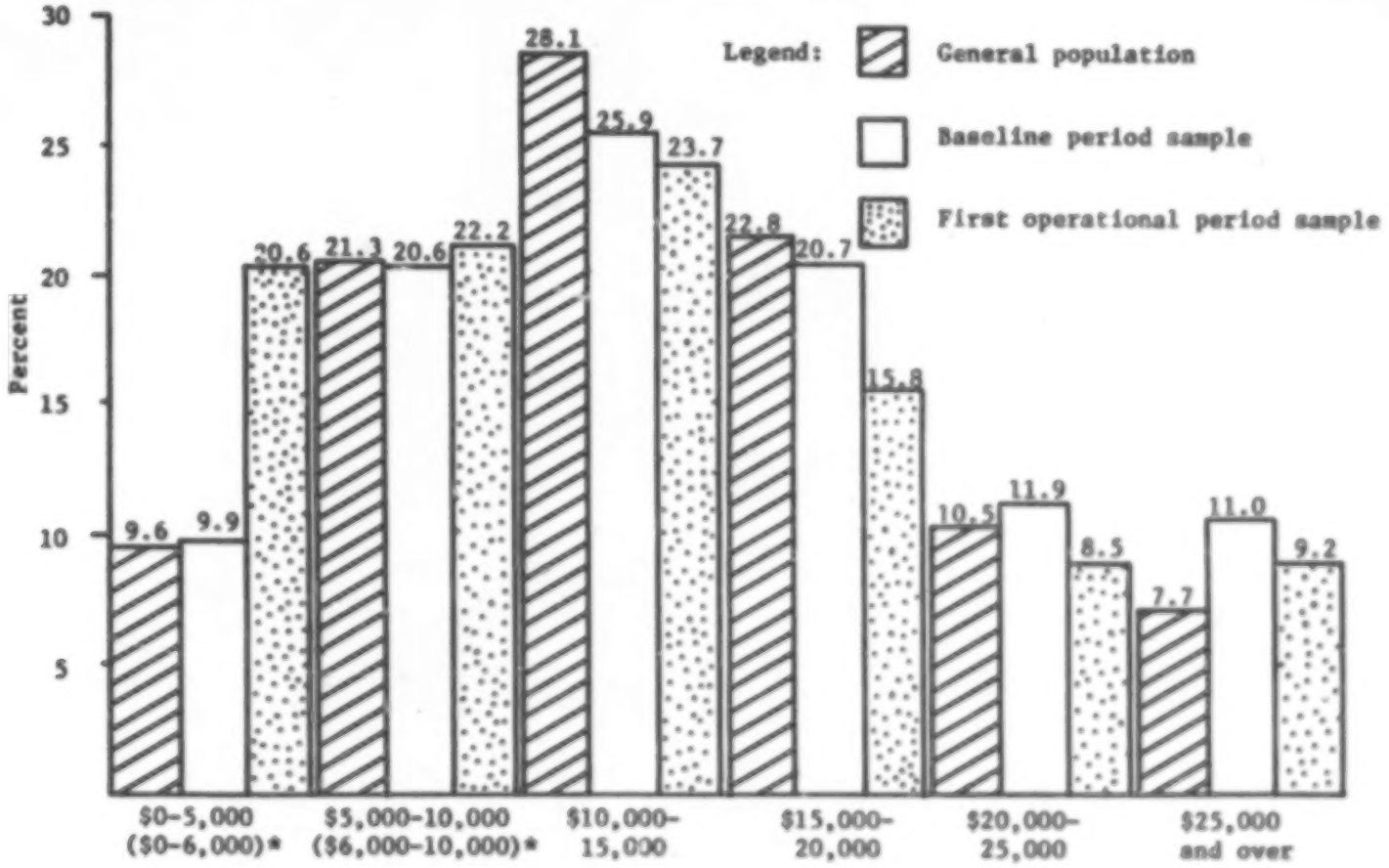
Family income and educational attainment were compared between the two samples (baseline period and first operational period) and with the general population of Tennessee. A more ideal comparison would have been between the samples and a subset population which represented only families with small children. These data were not readily available for comparative purposes. The two samples generally represented parents between 20 and 40 years of age who have children under four years of age.

Family Income

The question seeking information about family income contained seven categories with each having a $5,000 incremental range, except the last one which was theoretically an open ended category of $30,000 and over. The question read "What was your family income last year before taxes? (If you are single/not living with a mate, what was your personal income?)." During the data collection periods subjects were asked to complete a questionnaire with this question and nine other questions. More respondents failed to answer this question than any other; the response rate was 73.5 percent (1913 of 2504 baseline and 1350 of 1937 operational). Figure A-1 depicts the comparison between the distribution of income levels in the baseline period and first operational period samples and the general population.

The largest differences between the sample data and the established averages for family income for all Tennessee families was in the "below $5,000" category. Because of the age difference between those in the sampled group and those of the general population which make up the lower income group, this difference was expected. Another possible contributing factor to this difference is low vehicle ownership for this income level.

The baseline data on family income were for 1976, since the question asked for income of "last year." The first operational period data represented 1977 income. The general population income data is for 1975. These



*General population

Source: U.S. Department of Commerce, Bureau of the Census, Current Population Reports, Consumer Income, Series P-60, No. 112, issued June 1978.

FIGURE A-1

COMPARISON OF INCOME DISTRIBUTIONS BETWEEN SAMPLE DATA AND GENERAL POPULATION OF TENNESSEE

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three dates were considered when comparing the sampled groups with each other and with the general population. It appeared that the samples taken for both the baseline and first operational periods compared favorably with each other, which was more important than a favorable comparison between the sample and the general population. It was important, however, that the sample be representative of all income levels, which it appeared to be.

Education

The questions asked to gather information on educational attainment were "What is the highest level of education you have completed?" and "What is the highest level of education your mate has completed?" Although this question was not as sensitive as asking an income level question, the response rate was only 84.9 percent. Comparisons of percentages of educational attainment for the two periods showed small differences. When the two periods were compared to the averages for the population of adults over 24 years of age in Tennessee, some differences appeared. The distribution of the educational levels is illustrated in Figure A-2. As with income levels, the lower portion of the scale was where the largest differences occurred. The age difference between the respondents and their mates in the sample and the population over 24 years of age likely accounts for a large portion of the difference. The other categories compared favorably as expected.

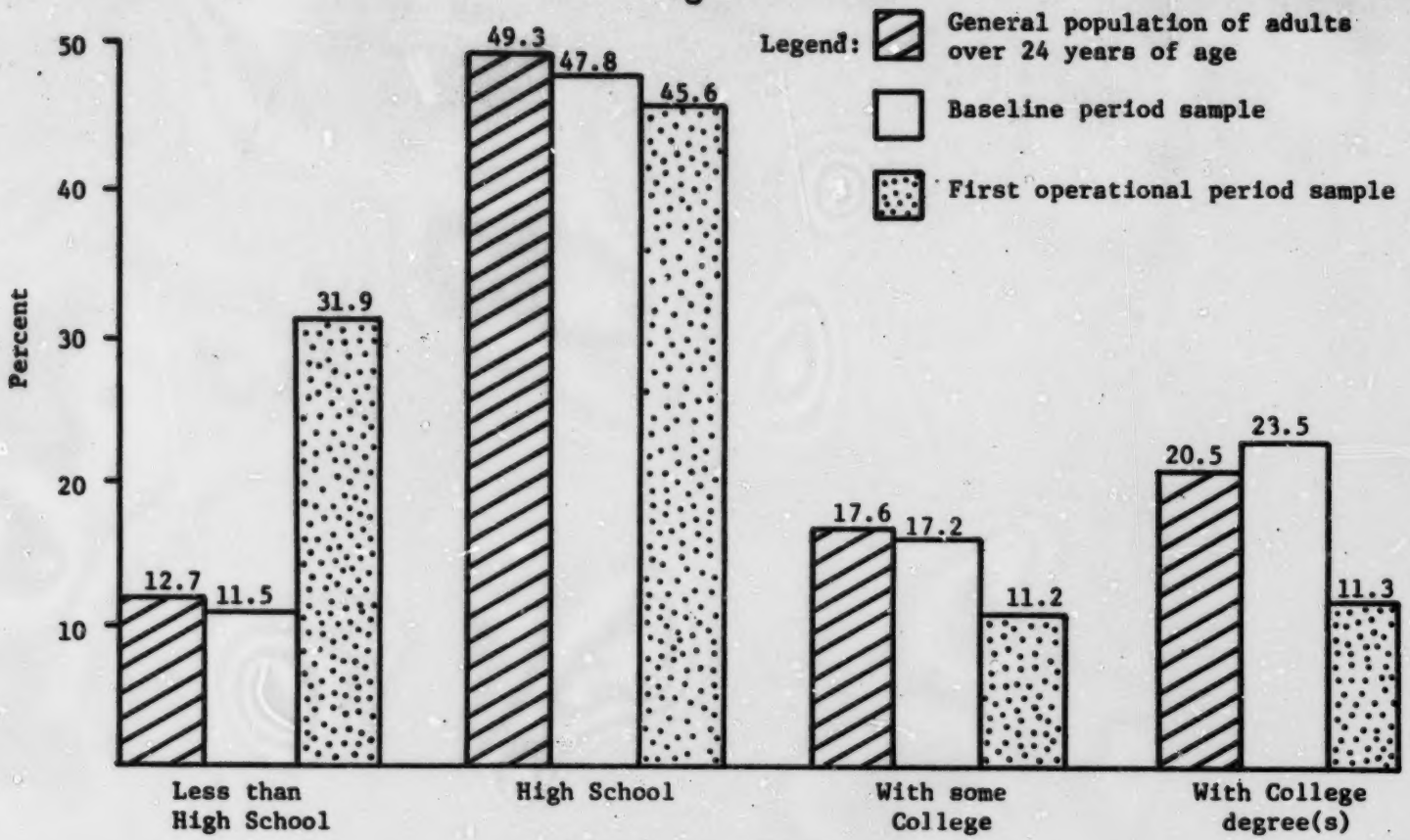
Tier I (Observational) Level Data

The total number of observations of small children was less for the first operational data collection period because of the modified sampling plan which was implemented. A tabulation was made of the total number of vehicles observed, the number with small children, and the percentages of vehicles with small children (Table A-1). The contrast in the numbers of observations is a function of the size of the shopping centers for the target area as well as the number of interviewers on the team trying to track the vehicles observed.

The percentages of vehicles with small children were highest for the Memphis target area (11.5 percent). This percentage was comparable to 11.1 percent for Memphis during the baseline period. Percentages for other target areas also were comparable for the two periods.

A summary of the number of children observed and percentages of their dispositions was made (Table A-2). The summary includes only child #1 and child #2, although occasionally as many as three or four small children estimated to be under four were present in one vehicle. Approximately the same percentage of second children (child #2) was observed during the first operational period as for the baseline period--12.4 percent (452 of 3659) compared to 12.8 percent. The percentage of use of CRDs by second children increased considerably between the baseline and first operational periods; usage was only 1.9 percent for the baseline period but 5.1 for the operational period. The percentage of second children being held by older passengers also increased from 5.8 percent to 9.1 percent.

Comparisons of the disposition of child #1 in the vehicle between the two periods showed 10.4 percent in CRDs for the baseline period and 16.7 percent for the first operational period. It was expected that the percentage of children being held by an older passenger might increase after the effective



Source: U.S. Department of Commerce, Bureau of the Census, Current Population Reports, Consumer Income, Series P-60, No. 112, issued June 1978.

FIGURE A-2

COMPARISON OF THE DISTRIBUTIONS OF EDUCATIONAL ATTAINMENT LEVELS BETWEEN SAMPLE DATA AND GENERAL POPULATION

TABLE A-1

SUMMARY OF FIRST OPERATIONAL PERIOD RAW FIELD OBSERVATIONAL DATA (TOTAL VEHICLES AND VEHICLES WITH SMALL CHILDREN)

Target Area	Number of Vehicles Observed[a]	Number of Vehicles With Small Children[b]	Percentage of Vehicles With Small Children
Memphis	4,607	531	11.5
Nashville	8,106	686	8.5
Knoxville	9,831	776	7.9
Chattanooga	6,635	674	10.2
Tri-Cities	6,619	527	8.0
Total Urban	35,798	3,868	10.8
Nonurban Areas	4,761	511	10.7
Total Urban and Nonurban	40,559	4,379	10.8

[a]This number represents the total number of vehicles observed, including out-of-state vehicles.

[b]This number, taken from the raw data files, includes out-of-state vehicles observed with small children at the tier one observational level.

TABLE A-2

SUMMARY OF PERCENTAGES OF DISPOSITIONS OF CHILDREN OBSERVED AT THE TIER 1 LEVEL FOR THE FIRST OPERATIONAL PERIOD (ROW PERCENTAGES)

Target Area	Child No.	Number of Observations	In Child Restraint Device (CRD) Percent	Held by Passenger Percent	Held by Driver Percent	Other Percent
Memphis	1	465	14.2	18.9	3.4	63.4
	2	61	4.9	19.7	1.6	73.8
Nashville	1	615	20.5	25.7	2.3	51.5
	2	73	5.5	5.5	0.0	89.0
Knoxville	1	637	19.0	34.7	1.6	44.7
	2	80	3.8	13.8	2.5	80.0
Chattanooga	1	603	16.7	27.7	3.8	51.7
	2	101	6.9	6.9	1.0	85.1
Tri-Cities	1	454	15.4	28.4	3.3	52.9
	2	52	7.7	9.6	0.0	82.7
Total Urban	1	2774	17.4	27.5	2.8	52.2
	2	367	5.7	10.6	1.1	82.6
Nonurban Areas	1	433	12.2	25.4	1.8	60.5
	2	85	2.4	2.4	1.2	94.1
Total Urban and Nonurban Areas	1	3207	16.7	27.2	2.7	53.4
	2	452	5.1	9.1	1.1	84.7

date of the law, but this did not occur as evidenced by comparing the two periods' percentages. Although the percentage of second child being held by older passengers was up for the operational period, there was a decrease for first child being held from 28.9 percent to 27.2 percent. The overall percentages of children (both child #1 and child #2) being held by older passengers were 26.0 for the baseline period and 25.0 for the operational period.

Tier 2 Level Data

A total of 2,142 observations of children under four years of age were made in the Tier 2 level for the first operational period. This number included child #1 and #2 in the vehicle; it was rare that more than two children under age four were observed in the same vehicle. A total of 1,937 interviews of adults with children under age four were conducted at this level.

Children's Characteristics. A tabulation of the percentages of children by age and sex was made (Table A-3). An examination of the percentages of children by age and sex was made (Table A-3). An examination of the percentages of children by age and sex for the two periods showed little difference overall. The major difference in the two data sets is between the percentages of children under age one in the nonurban areas. The baseline period data on children under one year of age in the nonurban area showed a relatively low percentage (15.8); the operational period data for the same age group showed 22.4 percent which was closer to the two overall percentages of 21.6 for the baseline period and 22.6 for the operational period. Another variability in the data for the two periods was with the percentages of male and female children in the nonurban areas. The baseline period percentage for females was 46.4 compared to 50.6 for the operational period.

Drivers' Characteristics. A summary of drivers' relation to children and drivers' sex is shown in Table A-4. The percentage for each relationship of drivers to children remained relatively constant for the first operational period as for the baseline period. The percentage of male and female drivers with children under age four remained almost exactly the same for the nonurban areas, but there was an increase in the percentage of female drivers in the urban areas over the baseline percentages; 50.9 percent for the baseline period and 56.4 percent for the first operational period.

A comparison of users and nonusers of CRDs by drivers' sex was made for the first operational period (Table A-5). Only minor differences were found in the percentages of males and females who used CRDs in the baseline period and in the first operational period. Among all drivers not utilizing CRDs, 57.9 percent during the operational period were females compared to 52.7 percent during the baseline period. This increase may be attributed primarily to the increase in female nonusers in the urban areas from the baseline to operational periods. The baseline period data showed more male than female nonusers of CRDs in the urban areas. The data collected after the law showed more females were nonusers in urban areas.

Vehicle Information. Information collected during the operational period on the properties of vehicles parallel those collected prior to the law. The results for the first operational period are shown in Tables A-6 through A-9.

TABLE A-3

SUMMARY OF AGE AND SEX OF CHILDREN AT TIER 2 LEVEL FOR THE FIRST OPERATIONAL PERIOD
(ROW PERCENTAGES)

Target Area	Number of Observations	Information on Child*					
		By Age (Percent)				By Sex (Percent)	
		<1	1	2	3	F	M
Memphis	342	20.5	26.9	29.8	22.8	52.9	47.1
Nashville	415	27.2	28.0	22.4	22.4	49.9	50.1
Knoxville	399	18.6	29.3	26.3	25.8	47.6	52.4
Chattanooga	360	23.3	27.2	28.1	21.4	50.6	49.4
Tri-Cities	282	22.4	25.9	27.3	24.4	50.6	49.4
Total Urban	1798	22.7	28.0	26.2	33.1	50.2	49.8
Nonurban Areas	344	22.4	25.9	27.3	24.4	50.6	49.4
Total Urban and Nonurban	2142	22.6	27.6	26.4	23.3	50.3	49.7

*Children #1 and #2 only.

TABLE A-4

SUMMARY OF DRIVERS' RELATION TO CHILD(REN) AND SEX OF DRIVERS
AT THE TIER 2 LEVEL FOR THE FIRST OPERATIONAL PERIOD
(ROW PERCENTAGES)

Target Area	Number of Observations*	Drivers' Relation to Child(ren)				Number of Observations*	Drivers' Sex	
		Parent Percent	Relative Percent	Friend Percent	Other Percent		Female Percent	Male Percent
Memphis	313	87.2	10.6	2.2	0.0	285	70.2	29.8
Nashville	376	86.7	9.6	3.5	0.2	338	56.2	43.8
Knoxville	359	84.7	12.5	2.5	0.3	353	49.9	50.1
Chattanooga	333	88.3	9.3	1.8	0.6	304	53.6	46.4
Tri-Cities	247	91.1	7.3	1.6	0.0	255	53.3	46.7
Total Urban	1628	87.3	10.0	2.4	0.3	1535	56.4	43.6
Nonurban Areas	297	80.1	15.5	3.7	0.7	277	67.1	32.9
Total Urban and Nonurban Areas	1925	86.2	10.9	2.6	0.3	1812	58.0	42.0

*Includes child #1 and child #2.

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TABLE A-5

COMPARISON OF MALE AND FEMALE DRIVERS AMONG USERS AND NONUSERS OF CRDs AT THE TIER 2 LEVEL FOR THE FIRST OPERATIONAL PERIOD (ROW PERCENTAGES)

Target Areas	Number of Observations	Drivers With Child(ren) Using CRDs*			Drivers With Child(ren) Not Using CRDs		
		N	Female Percent	Male Percent	N	Female Percent	Male Percent
Memphis	272	54	68.5	31.5	218	71.1	28.9
Nashville	329	106	55.7	44.3	223	56.1	43.9
Knoxville	344	91	51.6	48.4	253	49.8	50.2
Chattanooga	292	55	61.8	38.2	237	50.6	49.4
Tri-Cities	246	56	48.2	51.8	190	55.3	44.7
Total Urban	1483	362	56.4	43.6	1121	56.3	43.7
Nonrban Areas	272	43	79.1	20.9	229	65.5	34.5
Total Urban and NonUrban Areas	1755	405	58.8	41.2	1350	57.9	42.1

TABLE A-6

SUMMARY OF PERCENTAGES OF INFORMATION ON VEHICLES WITH CHILDREN UNDER FOUR AT THE TIER 2 LEVEL FOR THE FIRST OPERATIONAL PERIOD--YEAR OF VEHICLE

Target Area(s)	Number of Observations	Vehicle Information: Year of Vehicle			
		<69	69-73	74	75-78
Memphis	269	5.6	36.8	13.8	43.9
Nashville	319	5.3	34.8	9.4	50.5
Knoxville	335	12.2	37.0	11.0	39.7
Chattanooga	290	10.7	36.2	14.8	38.3
Tri-Cities	251	11.6	40.6	6.4	41.4
Total Urban	1464	9.1	37.0	11.1	42.8
Nonurban Area	276	10.9	35.9	10.1	43.1
Total Urban and Nonurban	1740	9.4	36.8	11.0	42.9

TABLE A-7

SUMMARY OF PERCENTAGES OF INFORMATION ON VEHICLES WITH CHILDREN UNDER FOUR AT THE TIER 2 LEVEL FOR THE FIRST OPERATIONAL PERIOD--MANUFACTURER

Target Area(s)	Number of Observations	Vehicle Information: Manufacturer				
		AMC	Chrysler	Ford	GM	Foreign
Memphis	272	3.7	8.5	29.4	42.6	15.8
Nashville	356	2.2	12.6	23.9	49.2	12.1
Knoxville	345	1.7	15.1	25.5	46.7	11.0
Chattanooga	332	1.5	13.6	23.5	51.2	10.2
Tri-Cities	259	2.7	14.7	23.2	47.9	11.6
Total Urban	1564	2.3	13.0	25.0	47.7	12.0
Nonurban Area	292	1.7	9.6	29.8	52.1	6.8
Total Urban and Nonurban	1586	2.2	12.4	25.8	48.4	11.2

TABLE A-8

SUMMARY OF PERCENTAGES OF INFORMATION ON VEHICLES WITH CHILDREN UNDER FOUR AT THE TIER 2 LEVEL FOR THE FIRST OPERATIONAL PERIOD--SIZE

Target Area(s)	Number of Observations	Vehicle Information		
		Size		
		Subcompact	Compact	Full Size
Memphis	269	13.0	35.7	51.3
Nashville	311	11.6	27.0	61.4
Knoxville	336	11.0	21.1	67.9
Chattanooga	278	6.8	25.9	67.3
Tri-Cities	249	3.2	26.9	69.9
Total Urban	1443	9.4	27.0	63.6
Nonurban	261	9.2	19.9	70.9
Total Urban and Nonurban	1704	9.3	26.0	64.7

TABLE A-9

SUMMARY OF PERCENTAGES OF INFORMATION ON VEHICLES WITH CHILDREN UNDER FOUR AT THE TIER 2 LEVEL FOR THE FIRST OPERATIONAL PERIOD--BODY STYLE

Target Area(s)	Number of Observations	Vehicle Information: Body Style					
		2-door Sedan	4-door Sedan Wagon	2-door Station Wagon	4-door Station Wagon	Van/ Pickup	Other
Memphis	291	60.1	23.0	1.0	11.0	4.5	0.3
Nashville	340	58.5	22.1	2.6	10.6	5.3	0.9
Knoxville	352	54.8	24.4	1.1	7.7	11.1	0.9
Chattanooga	307	58.0	20.8	3.3	10.7	6.2	1.0
Tri-Cities	259	59.8	19.7	3.5	8.1	7.7	1.2
Total Urban	1549	58.1	22.1	2.3	9.6	7.0	0.8
Nonurban	278	53.6	24.1	2.5	7.6	9.0	3.2
Total Urban and Nonurban	1827	57.4	22.4	2.3	9.3	7.3	1.2

CRD Ownership, Types and Manufacturers. There were no important differences in the percentages of types of CRDs owned or of manufacturers when the two data sets for the two periods were compared. The first operational period results are seen in Tables A-10 and A-11.

Types of CRDs. A comparison of CRD types by use/nonuse for Nashville and a combination of areas was prepared (Table A-12). The percentages of usage of CRDs for the baseline period were similar. The protective shield types had some large increases; however, frequencies were still low for this type.

Two noticeable changes occurred between the periods; of those CRDs observed in vehicles but not being used, the car seat type increased while infant carriers decreased. During the baseline period, 75.4 percent of all CRDs not in use were the car seat type, but during the operational period this percentage climbed to 82.4 percent for all areas surveyed. This difference was more pronounced in Nashville where the baseline period data showed 70.6 percent and the operational period data showed 82.1 percent. Infant carrier percentages went in the opposite direction, from 23.5 percent to 15.4 percent nonusage for Nashville and from 20.4 percent to 13.2 percent nonusage for all target areas combined. The greatest difference occurred in the nonurban areas where nonusage dropped from 31.3 percent to 14.3 percent between the two time periods.

It is suspected that one reason the percentages of nonuse were up for car seats and down for infant carriers is that many CRDs (all types) were purchased to obey the law, but parents found toddlers to be much harder to keep in CRDs than infants.

Child Restraint Usage Comparisons

A compilation of percentages of use at each tier level for each target area was made for the operational period (Table A-13). The summary of the numbers of observations and the usage rates are shown in Table A-14. The overall usage rate for the forst operational period was 17.5 percent based on a weighted average of all target areas. This is an increase from 10.9 percent from the baseline period. The largest increase occurred in Nashville (14.0 percent to 22.1 percent). Memphis had the least change between periods (10.9 percent to 13.5 percent). All urban areas combined went from 11.8 percent to 18.4 percent usage. The nonurban areas had a 92 percent change from 6.5 percent to 12.5 percent in usage. Nashville was the only target area where the comprehensive PI&E program was implemented during the first six months. The comprehensive PI&E plan provided for a type of exposure of information about the law and the need for parents of small children to provide protection for them in motor vehicles which was different from the basic state plan. Each plan was designed to inform parents. The basic state plan involved getting informative brochures into the hands of parents of small children by making distribution to those places they would most likely be going with their child. The comprehensive plan, on the other hand, involved informing the general public by television, radio, billboards and newspaper.

Changes in CRD Usage. In the discussions of changes of usage from baseline period to operational period, only target areas or groups of target areas

TABLE A-10

CRD OWNERSHIP BY TYPE, PERCENTAGES FOR THE FIRST OPERATIONAL PERIOD
(ROW PERCENTAGES)

CRD Disposition	Number of Types Identified	Type			
		Infant Carrier Percent	Protective Shield Percent	Car Seat Percent	Harness Percent
Overall Ownership	1095	14.3	6.1	78.2	1.4
Not Present in Vehicle	449	6.7	8.7	82.4	2.2
Present in Vehicle	646	19.7	4.3	75.2	0.8
Present and in Use in Vehicle	411	20.9	5.1	73.3	0.7

TABLE A-11

CRD OWNERSHIP BY MANUFACTURER, PERCENTAGES FOR THE FIRST OPERATIONAL PERIOD (ROW PERCENTAGES)*

CRD Disposition	Number of Manufacturers Identified	Manufacturer			
		Bobby-Mac Percent	General Motors Percent	Peterson Percent	Others Percent
Overall Ownership	508	27.4	16.7	14.6	41.3
Not Present in Vehicle	154	37.0	20.1	13.6	29.2
Present in Vehicle	354	23.2	15.2	15.0	46.6
Present and in Use in Vehicle	231	20.8	12.6	14.7	51.9

*Percentages based on number of observations where manufacturers were known.

TABLE A-12

COMPARISON OF CRD TYPES OBSERVED AT THE TIER 2 LEVEL FOR THE FIRST OPERATIONAL PERIOD (ROW PERCENTAGES)

CRD Disposition	Number of Observations Identified		CRD Type: Infant Carrier Percent	CRD Type: Protective Shield Percent	CRD Type: Car Seat Percent	CRD Type: Harness Percent
Nashville	Used	103	24.3	6.7	68.0	1.0
	Not Used	39	15.4	2.6	82.1	0.0
Other Urban Areas	Used	264	18.2	4.5	76.5	0.8
	Not Used	92	12.0	3.3	84.8	0.0
All Urban Areas	Used	367	19.9	5.2	74.1	0.8
	Not Used	131	13.0	3.1	84.0	0.0
Nonurban Areas	Used	44	29.5	4.6	65.9	0.0
	Not Used	28	14.3	3.6	75.0	7.1
All Urban and Nonurban	Used	411	20.9	5.2	73.2	0.7
	Not Used	159	13.2	3.1	82.4	1.3

TABLE A-13

PERCENTAGES OF FIRST OPERATIONAL OBSERVATIONS OF SMALL CHILDREN AND CRD USAGE AT THE TIER 1 AND TIER 2 LEVELS

Target Area	Tier 1			Tier 2		
	Number of Observations of Small Children	Number and Percent of Children in CRDs		Number of Observations of Small Children	Number and Percent of Children in CRDs	
Memphis	526	69	13.1	341	62	18.2
Nashville	688	130	18.9	425	117	27.5
Knoxville	717	124	17.3	395	98	24.8
Chattanooga	704	108	15.3	371	72	19.4
Tri-Cities	506	74	14.6	289	60	20.8
Total Urban	3141	505	16.1	1821	409	22.5
Nonurban Areas	513	53	10.3	348	47	13.5
Total Urban and Nonurban	3654	558	15.3	2169	456	21.0

TABLE A-14

COMPOSITE FIRST OPERATIONAL CRD USAGE RATES USING BOTH TIER 1 AND TIER 2 LEVEL DATA

Target Area	Tier 1 Data,[a] Unmatched With Tier 2	Tier 2 Only Data	Tier 2/Tier 2 Matched Data	Effective[b] Number of Observations	Composite CRD Usage Rate Percent
Memphis	305	62	279	532	13.5
Nashville	425	94	331	737	22.1
Knoxville	464	66	329	711	20.4
Chattanooga	448	96	275	742	16.5
Tri-Cities	291	45	244	519	17.9
Total Urban	387[c]	73[c]	292[c]	648[c]	18.4[d]
Nonurban Areas	287	62	286	521	12.5
Total Urban and Nonurban Areas	370[c]	71[c]	291[c]	627[c]	17.5[d]

[a]Includes Tier 1 data of over-age children and refusals at the Tier 2 level.

[b]Composite figure from combined Tier 1 and Tier 2 data.

[c]Averages.

[d]Weighted averages.

have been mentioned. Those were important for comparisons because of the levels of treatment, but statewide CRD usage was also estimated for comparative purposes.

The 1975 estimate of population in Tennessee was 4,174,000; of this number 61.4 percent lived in the five major standard metropolitan statistical areas (SMSAs). The urban sample was taken at shopping centers which had market areas approximately coinciding with the SMSA boundaries. However, the sampling plan favored urban areas. Therefore, a simple average based on a 50-50 weighting for urban and rural areas was used to estimate that about 9.2 percent of those subject to the child passenger law were using CRDs during the period (baseline) before January 1, 1978.

The overall state usage rate utilizing the same rationale was 15.4 percent when measured in June 1978. This represents an increase of 6.2 percentage points and a 67 percent increase from the baseline period condition.

Data collected approximately six months after the baseline period collection revealed an increase in usage in each target area. Usage in Nashville had increased by 8.1 percentage points to 22.1 percent usage. Nonurban areas had increased to 12.5 percent (6.0 percentage points increase), and urban areas other than Nashville went to 17.3 percent from 11.3 percent. A comparison of the CRD usage rates is shown in Table A-15. The differences between periods were all significant at the 0.10 level or better. The comparison of usage rates increases between Nashville and the other urban areas was found to be insignificant. The actual difference was only 2.1 percentage points; there was a 6.0 percentage point change for other urban areas and an 8.1 percentage point change for Nashville.

There may have been several factors affecting the difference between the usage rate in the Nashville-Davidson SMSA and the other urban areas. Because Nashville is the capitol of Tennessee, the site of all state legislative activities, residents of that area are exposed to current lawmaking via the news media more so than residents in the remainder of the state. The child restraint law was passed in the spring of 1977 and received news media coverage in Nashville. This along with other factors raised the awareness of the law in the Nashville area likely contributing to a higher initial usage rate. Supporting evidence to this conjecture is the fact that Columbia, which is not in the Nashville-Davidson SMSA area but is close enough to receive television signals, had a substantially higher usage rate initially than did the other two comparable nonurban areas. Columbia had a CRD usage rate of 13.9 percent which parallels Nashville's 14.0, while the other nonurban areas of Dyersburg and Morristown had 2.5 percent and 5.9 percent usage respectively. Another factor may have been that other urban areas gained access to and used PSAs intended only for Nashville for the first six months. This happened at least once during the first operational period.

Contingency Table Analysis of CRD Usage

The same variables were chosen to be crosstabulated with CRD usage for the first operational period as were selected for analysis using baseline data. Comparisons of these analyses will be made in this section by characteristics of the children observed, family characteristics, vehicle information and CRD type.

TABLE A-15

COMPARISON OF CRD USAGE RATES BEFORE AND SIX MONTHS AFTER THE LAW AND PI&E PROGRAM

Area	Percent Before	Percent After	Percentage Points Gained
Nashville	14.0	22.1	8.1
Other Urban	11.3[a]	17.3[a]	6.0
Total Urban	11.8[a]	18.4[a]	6.6
Nonurban	6.5	12.5	6.0
Statewide	9.2[b]	15.4[b]	6.2

[a]Based on weighted averages of the areas.

[b]Based on the average of the urban areas and nonurban areas.

CRD Usage and Characteristics of Children. CRD usage was up considerably by age of child for the first operational period over the baseline period. There was an increase of approximately 10 percentage points in usage for each age group up to three years old where the difference was much smaller (6.1 percent to 7.5 percent). As with baseline period data, age again was found to be a highly significant contributor to usage of CRDs (Table A-16).

The usage rates by sex of children were about the same as during the baseline period, and again there was no significant relationship between CRD usage and the sex of the child during the operational period. The number of children in the vehicle under the age of four was a significant factor in determining CRD usage during the baseline period, but during the operational period the percentage of usage when only one child was present increased to the point that there was no significant relationship between usage and the number of children in the vehicle (see Table A-17). The percentage for one child being present and using CRDs changed from 12.8 percent for the baseline period to 21.6 percent for the operational period.

CRD Usage and Family Characteristics. Those family characteristics which were significant in determining usage were (1) family income, (2) marital status, (3) number of children of age four and over in the vehicle, (4) number of adults in the vehicle, (5) employment status of respondent, (6) employment status of couple (respondent and respondent's mate combined), and (7) educational status of respondent, respondent's mate and couple (Table A-18). The level of significance differed to some extent for all variables considered, but only one variable changed enough to go from being insignificant during the baseline period to significant for the operational period. The number of children of age four and older in the vehicle was shown to be insignificant during the baseline period, but during the first operational period this variable became significant at the .01 level relative to usage.

All the percentages of usage for the operational period for all variables measured and crosstabulated were expected to be greater. There were four subcategories where this did not occur. When there were three children in the vehicle older than three, the usage rate (4.0 percent) was lower for the operational period than for the baseline period (9.4 percent). The same was true with three adults present in the vehicle; the baseline period usage rate of 7.7 percent dropped to 2.7 for the operational period. A logical explanation may seem to be that usage declined because of more laps and arms available to hold small children not restrained in CRDs, but this logic is weakened somewhat by the fact that usage increased when there were four or more passengers over four years of age in the vehicle. The other two subcategories where usage was lower during the operational period were for those respondents who classified themselves in either the "student, retired or other" group or the "unemployed" group.

CRD Usage and Vehicle Information. The year of manufacture of the vehicle was the only variable which changed from being an insignificant factor relative to CRD usage during the baseline period to one of significance for the first operational period (Table A-19). One contributor to the difference was possibly the fact that the operational period data were collected approximately six months after the baseline period data collection in which time more 1978 year models and fewer older vehicles were observed. During this period of time, the percentage of owners of newer vehicles increased from 37.9 percent to 42.9 percent.

TABLE A-16

CHILDREN CHARACTERISTICS VERSUS CRD USAGE RATES
FOR THE FIRST OPERATIONAL PERIOD

Characteristic	Number of Observations	CRD Usage Rate Percent	Chi-Square	Significance Level
			107.3	<0.001
Age:				
<1	404	34.9		
1	520	28.8		
2	505	18.4		
3	425	7.5		
			0.03*	0.854
Sex:				
Female	905	22.1		
Male	886	22.6		

*Corrected Chi-Square.

TABLE A-17

CRD USAGE VERSUS NUMBER OF CHILDREN IN THE VEHICLE
FOR THE FIRST OPERATIONAL PERIOD

Number of Children Under Age 4 in Vehicle	Number of Observations	CRD Usage Rate	Chi-Square	Significance Level
			4.1	0.1295
1	1636	21.6		
2	206	27.7		
3	15	26.7		

TABLE A-18

FAMILY CHARACTERISTICS VERSUS CRD USAGE RATES FOR THE FIRST OPERATIONAL PERIOD

Characteristics	Number of Observations	CRD Usage Rate Percent	Chi-Square	Significance Level
Family Income:			25.35	<0.001
0,000-9,999	397	16.4		
10,000-14,999	336	25.9		
15,000-19,999	266	29.7		
20,000->20,000	297	31.3		
Marital Status:			15.45*	0.001
Married/living with mate	1368	25.1		
Single/living without a mate	147	10.2		
Number of Children in Vehicle (4-17 years old):			13.63	0.008
1	491	24.2		
2	184	17.4		
3	50	4.0		
4 or more	22	18.2		
Number of Adults in Vehicle:			20.51	0.001
1	838	23.0		
2	430	19.3		
3	74	2.7		
4 or more	18	5.6		

TABLE A-18 (continued)

Characteristics	Number of Observations	CRD Usage Rate Percent	Chi-Square	Significance Level
Employment Status of Respondent:			18.28	0.001
Full-time	836	23.1		
Part-time	101	28.7		
Homemaker	439	28.0		
Student, Retired or Other	43	11.6		
Unemployed	70	8.6		
Employment Status of Respondent's Mate:			4.47	0.346
Full-time	995	24.4		
Part-time	43	32.6		
Homemaker	244	28.7		
Student, Retired, or Other	41	19.5		
Unemployed	36	19.4		
Employment Status of Couple:			12.16	0.007
Both Full-time	446	20.2		
1 Full-time, 1 not Full-time and not Homemaker	193	26.9		
1 Full-time, 1 Homemaker	635	29.3		
Both, Less than Full-time	17	17.6		
Educational Status of Respondent:			67.04	<0.001
Less than High School	150	14.0		
High School, G.E.D., and/or Vocational/Technical School	755	18.4		
Some College (no degree)	260	24.2		
College Degree(s)	344	39.5		

TABLE A-18 (continued)

Characteristics	Number of Observations	CRD Usage Rate Percent	Chi-Square	Significance Level
Educational Status of Respondent's Mate:			79.15	<0.001
Less than High School	188	18.1		
High School, G.E.D., and/or Vocational/Technical School	635	17.2		
Some College (no degree)	242	25.6		
College Degree(s)	322	42.5		
Educational Status of Couple:			73.41	<0.001
Both, Less than High School	71	15.5		
1 with High School/Vocational Technical, 1 less than High School	170	18.8		
Both with High School/ Vo-Tech/Some College	607	17.3		
1 with College Degree(s), 1 with less than College Degree	50	24.0		
Both with College Degree(s)	427	39.3		

*Corrected Chi-Square.

TABLE A-19

VEHICLE INFORMATION VERSUS CRD USAGE RATES FOR THE FIRST OPERATIONAL PERIOD

Characteristic	Number of Observations	CRD Usage Rate Percent	Chi-Square	Significance Level
Vehicle Ownership:			15.65*	<0.001
Owned	1339	25.2		
Not Owned	187	11.8		
Number of Vehicles Owned:			4.18*	.041
One	560	20.9		
Two or More	930	25.7		
Year of Vehicle:			8.77	.033
<69	160	16.3		
69-73	626	20.9		
74	185	24.3		
75-78	712	25.7		
Vehicle Manufacturer:			2.96	.565
AMC	37	29.7		
Chrysler	203	25.6		
Ford	412	21.1		
General Motors	785	22.8		
Foreign	184	25.0		
Vehicle Size:			7.58	.023
Subcompact	157	31.8		
Compact	429	23.8		
Full Size	1067	21.9		

TABLE A-19 (continued)

Characteristic	Number of Observations	CRD Usage Rate Percent	Chi-Square	Significance Level
Body Style:			9.14	.104
2 Door Sedan	1016	22.4		
4 Door Sedan	403	25.3		
2 Door Station Wagon	41	14.6		
4 Door Station Wagon	161	29.8		
Pickup/Van	128	18.0		
Other	21	19.0		

*Corrected Chi-Square.

The only subcategory in which there was a decrease in the CRD usage rate was two-door station wagons in the body style category. CRD usage was 24.5 percent for two-door station wagons for the baseline period compared to 14.6 percent usage for the first operational period. There is no apparent reason for this decline.

There were two substantial increases in usage between the two periods. CRD usage in observed AMC cars increased from 9.7 to 29.7 percent, however, there were only 31 and 37 observations for the baseline and operational periods respectively. Usage in subcompacts increased from 15.8 percent to 31.8 percent.

CRD Usage Versus Child Restraint Types. CRD usage was crosstabulated with the four types of CRDs used (Table A-20). This crosstabulation was compared to the one performed for the data collected during the baseline period. The chi-square significance testing for the operational data on types and usage showed that there was a significant difference in usage between the types used. Prior to January 1, 1978, the effective date of the law and PI&E implementation, there was no significant difference shown in usage with relation to types used. The frequency count for harnesses again was low as during the baseline period.

This comparison points out that more parents/guardians purchased and used infant carriers during the first operational period. The high rate of use of infant carriers may be attributed to the convenience of and relative ease of keeping infants in CRDs compared to relative difficulty with some toddlers.

Safety Belt Usage by Drivers

A total of 40,559 drivers were observed during the operational period (January through June 1978). A determination of whether the driver was using a safety belt was made in over 90 percent of the cases. This represents a small improvement (approximately 2.0 percent) over the baseline period.

The same pattern of lower safety belt usage in nonurban areas held for the first operational period of the study. Usage in nonurban areas, however, did increase at a greater rate than in urban areas: 2.1 to 3.6 (71.4 percent increase) for the nonurban areas and 7.4 to 8.1 (9.5 percent increase) for urban areas (Table A-21). There were two urban areas where the usage rate declined: Nashville (7.3 to 6.1) and Tri-Cities (6.7 to 5.3). The target area with the largest gain in usage between the baseline period and operational period was Knoxville (from an 8.7 percent usage rate to an 11.1 percent usage rate).

One objective of this study was to examine the relationship between the drivers' use of safety belts and children's use of CRDs in the same vehicle. Parallel data were collected for both periods to determine the percentages of usage of safety belts by drivers who had small children accompanying them in the vehicle. Those percentages are shown for the operational period in Table A-22. These percentages were compared with those calculated for the baseline period, and it was found that the percentage of usage of safety belts by drivers with small children increased substantially. Each target area experienced

TABLE A-20

CRD TYPE VERSUS CRD USAGE RATES FOR THE FIRST OPERATIONAL PERIOD

CRD Type	Number of Observations	CRD Usage Rate Percent	Chi-Square	Significance Level
			7.97	.047
Infant Carrier	109	84.4		
Protective Shield	26	67.9		
Car Seat	413	71.2		
Safety Harness	4	75.0		

TABLE A-21

SUMMARY OF SAFETY BELT USAGE BY DRIVERS
FOR THE FIRST OPERATIONAL PERIOD

Target Area	Number of Observations[a]	Number of Times Use was Undetermined	Number of Drivers Observed Using Safety Belts	Percent Use
Urban:				
Memphis	4607	360	236	5.6
Nashville	8106	978	436	6.1
Knoxville	9831	327	1059	11.1
Chattanooga	6635	1430[b]	580	11.1
Tri-Cities	6619	105	347	5.3
Total Urban Areas	35798	3200	2658	8.1[c]
Nonurban:				
Dyersburg	1654	431	31	2.5
Columbia	1145	53	38	3.5
Morristown	1962	70	83	4.4
Total Nonurban Areas	4761	554	152	3.6[c]
Combined Urban and Nonurban Areas	40559	3754	2810	7.6[c]

[a]This number includes some out-of-state vehicles.

[b]Estimation based on baseline data.

[c]Weighted averages.

TABLE A-22

PERCENTAGE OF USE OF SAFETY BELTS BY DRIVERS WITH SMALL CHILDREN IN VEHICLE AT THE TIER 1 LEVEL FOR THE FIRST OPERATIONAL PERIOD

	Number of Drivers with Small Children[a]	Number of Drivers Where There Was Undetermined Usage	Number of Drivers with Positive Determination of Safety Belt Usage	Percentage of Safety Belt Use by Drivers with Small Children
Memphis	531	131	47	11.8
Nashville	671	245	25	7.0
Knoxville	712	233	80	16.7
Chattanooga	634	246	27	7.0
Tri-Cities	485	135	31	8.9
Total Urban	3033	990	210	10.3[b]
Nonurban Areas	498	142	10	2.8
Total Urban and Nonurban Areas	3531	1132	220	9.2[b]

[a]This number from the valid Tier 1 data file includes vehicles with over-age children.

[b]Weighted averages.

an increase in usage, with Knoxville having the greatest increase from 3.3 percent to 16.7 percent. The overall increase was from 3.8 percent to 9.2 percent.

A further investigation of the relationship between drivers' use of safety belts and children's use of CRDs was made by preparing a matrix to test for significance between the two variables (Table A-23). The chi-square technique was used for the test. A significant relationship was found between CRD usage and seat belt usage (as was the case using baseline frequencies).

Using the frequencies in each cell of the matrix shown in Table A-23, a table of percentages for the four situations was made (Table A-24). Drivers who were observed as safety belt users also had their children in CRDs in 60 percent of the cases studied. This percentage compares to 44 percent for the period of time before the law. Only 16.1 percent of those drivers who had children under four with them and who were not using safety belts themselves were observed with children in CRDs in the vehicle. This percentage, however, is a vast improvement over the 7.3 percent for the baseline period.

Changes in Seat Belt Usage. It was hypothesized from the beginning of this study that seat belt usage would increase with an increase in CRD usage. It was recognized that this increase should occur to a greater degree among drivers with children under four since public information was focused on that population.

A summary of seat belt usage by drivers before and after the implementation of the law and the PI&E program is shown in Table A-25. The table shows the percentages of usage for all drivers observed and for a subset of drivers to include only those with children under age four in the vehicle with them. The overall usage rate increased for the state based on the assumption that the urban samples represent the population which lives in Tennessee's major SMSAs (61.4 percent of total). The overall rate increased one percentage point from 5.4 percent to 6.4 percent. The comparison between periods for the driver subset was more dramatic, going from 3.3 percent to 7.4 percent. Urban areas other than Nashville showed the largest difference in seat belt usage for drivers with small children; the rate went from 4.0 percent to 11.4 percent. All the urban areas had increases, but Nashville showed the smallest increase, gaining only 0.5 percentage points from 6.5 percent to 7.0 percent usage. It should be recalled that Nashville decreased in overall usage of seat belts by all drivers observed. This phenomenon is difficult to explain in light of the fact that Nashville was the target area which experienced the largest increase in CRD usage in the six-month period.

TABLE A-23

RELATIONSHIP BETWEEN DRIVERS' SAFETY BELT USAGE AND CHILD RESTRAINT USAGE FOR THE FIRST OPERATIONAL PERIOD

		CRD Usage		
	Decision	No	Yes	Total
Safety Belt Use by Drivers	Yes	48	72	120
	No	779	150	929
	Total	827	222	1049

TABLE A-24

PERCENTAGES OF RELATIONSHIPS BETWEEN DRIVERS' SAFETY BELT USE AND CHILD RESTRAINT USAGE FOR THE FIRST OPERATIONAL PERIOD (ROW PERCENTAGES)

			CRD Usage	
	Decision	Number of Observations	No	Yes
Safety Belt Usage By Drivers	Yes	120	40.0	60.0
	No	929	83.9	16.1

TABLE A-25

SUMMARY OF SEAT BELT USAGE BY DRIVERS BEFORE AND SIX MONTHS AFTER THE LAW AND PI&E PROGRAM

Area	All Drivers		Driver with Children Under Age Four	
	Percent Before	Percent After	Percent Before	Percent After
Nashville	7.3	6.1	6.5	7.0
Other Urban	7.8[a]	8.7[a]	4.0[a]	11.4[a]
Total Urban	7.4[a]	8.1[a]	4.5[a]	10.3[a]
Nonurban	2.1	3.6	1.4	2.8
Statewide	5.4[b]	6.4[b]	3.3[b]	7.4[b]

[a]Weighted averages based on sample sizes.

[b]Weighted average based on urban/nonurban population split.

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APPENDIX B

ANALYSIS OF THE CHARACTERISTICS OF USERS OF CHILD RESTRAINTS

This appendix consists of a detailed study of the characteristics of users of child restraint devices. Those variables which were found to be significant contributors to CRD usage in the previous analyses were examined more fully by utilizing two statistical methods, discriminant analysis and partial correlation analysis. The objectives of this analysis are (1) to determine if there is a set of characteristics which significantly distinguishes between users and nonusers of CRDs, (2) to determine the relationship between selected significant variables and CRD usage (the dependent variable) when the effect of two socioeconomic variables (educational level and family income) are adjusted for and (3) to provide a profile of the characteristics of users and nonusers.

Two statistical analyses were employed to examine CRD usage. Discriminant analysis was the method used to accomplish the first objective above, and partial correlation analysis was applied to adjust for the effects of educational attainment and family income. A profile of the characteristics of users and nonusers was developed from the results of the two analyses.

Discriminant Analysis

Discriminant analysis is a statistical technique used to distinguish between two or more groups. This technique linearly combines the discriminating variables such that the differences between the group means of the variables are maximized. The primary purpose for using discriminant analysis for this portion of the study was to discriminate between the CRD user group and nonuser group such that the specific characteristics of the groups that significantly distinguish one from the other may be ascertained. The results of discriminant analysis may prove to be an important tool in identifying target groups toward which specific attention may be given and behavioral characteristics of users which should be promoted among nonusers.

Procedure. The first step in the procedure was one of variable selection. Because many variables were measured and because some of the items on the questionnaire to measure the variables were sensitive, there were missing data. The amount of missing data was too great to use all variables concurrently in the discriminant analysis. For example, when the variables which were previously analyzed were entered into the discriminant analysis at the same time using the baseline data, the number of observations with no missing data was less than 20 percent of the total number of observations.

It was therefore necessary to be more selective in choosing the variables for a candidate list. Those variables which were found to be individually significant at the .05 level or better from the contingency table analyses formed the basis for the list. Added to the list were two variables which were not tested previously. Seat belt usage by passengers and driver relation to child (child #1) were found to have potential contributing influences on CRD usage when tested for significance. The full list of candidate variables which were identified for further analysis are summarized with their respective significance levels from previous tests for each period in Table B-1.

TABLE B-1

LIST OF CANDIDATE VARIABLES

Variable	Significance Level	
	Baseline	First Operational
Family Income	<0.001	<0.001
Educational Attainment of Respondent	<0.001	<0.001
Educational Attainment of Respondent's Mate	<0.001	<0.001
Age of Child (Child #1)	<0.001	<0.001
Vehicle Ownership	<0.001	<0.001
Number of Vehicles Owned	<0.001	0.041
Number of Adults in Vehicle	0.008	0.001
Employment Status of Respondent	0.001	0.001
Marital Status	0.018	0.001
Driver Relationship to Child (Child #1)	0.001[a]	0.001[a]
Seat Belt Usage of Passenger Other Than Small Children	0.001[a]	0.001[a]

[a]Determined by Correlation Analysis (zero order).

The next step in the process of selecting the influential variables as possible candidates was to analyze each variable individually against CRD usage to establish a priority list of potential discriminating variables. The discriminant analysis computer program (DISCRIM) of the Statistical Package for the Social Sciences was utilized to accomplish this task by analyzing one variable at a time. The analysis yielded a univariate F value for each variable. The variables were arranged in rank order according to the value of the F ratios for each period as shown in Table B-2.

A decision was made to eliminate the least important variables from the candidate list to establish a set of variables for the discriminant analysis which would have a high percentage of the total number of observations. Deleted first from the list were those variables which furnished supplemental but somewhat redundant information. These variables were educational attainment of the respondent's mate and marital status. Educational attainment of the respondent's mate was actually redundant information since educational attainment of the respondent was one of the other variables considered for the analysis. Educational attainment for both respondent and respondent's mate was approximately the same. Marital status is redundant information considering the information gained from the variable "driver's relation to child." Both of these variables primarily reveal whether or not the respondent is the parent of the child. Driver relationship to the child was a broader category than marital status. This category includes both married and single parents, friends, relatives and others.

Another variable deleted from consideration as one of the set to enter discriminant analysis was employment status of respondent. Not only was this variable partially a function of family income and educational attainment, but it was also among the most sensitive (along with income and education) on the questionnaire. Since there was a large number of missing data it was thought best to delete it. The last variable to be eliminated from the candidate list was "number of vehicles owned." This variable was eliminated on the basis of having the lowest univariate F value after the other three variables were deleted and on partial correlation results. Partial correlations were run on selected variables. The correlation coefficient dropped considerably when the number of vehicles was correlated with CRD usage, controlling for family income. The variable became insignificant when adjusted for family income during the operational period.

This elimination process left seven variables which are significant for both periods and which rank high among all the variables considered measured by the univariate F value. The seven chosen to be used as a set for the discriminant analysis are shown with partial F values and rank order of importance in Table B-3. These seven represent about 68 percent of all observations using baseline data and about 60 percent of all operational observations. It was recognized that the selection process used to obtain this reduced set of variables (less than one-half the original number) could have affected the significance level of the final results of discriminant analysis. The F values were checked against Bonferroni bounds to ensure an α-level of at least .05.

The correlations between each of the variables were useful in the examination of the effect of each variable or combination of variables on CRD usage for both periods. The correlation matrix for the seven selected independent

TABLE B-2

CANDIDATE VARIABLES FOR DISCRIMINANT ANALYSIS
(Univariate F Ratios)

Variable	F Ratios, Rank Order					
	Baseline			First Operational		
Seat Belt Usage of Passengers in Vehicle with Child	148.02	<0.001	1	124.42	<0.001	1
Educational Attainment of Respondent	67.54	<0.001	2	51.67	<0.001	2
Number of Adults in Vehicle	31.32	<0.001	3	25.13	<0.001	2
Family Income	31.25	<0.001	4	15.76	<0.001	4
Vehicle Ownership	14.16	<0.001	5	8.82	<0.003	6
Driver Relationship to Child (Child #1)	14.02	<0.001	6	10.95	<0.001	5
Age of Child (Child #1)	13.50	<0.001	7	8.54	<0.004	7

TABLE B-3

CORRELATION MATRIX FOR SEVEN INDEPENDENT VARIABLES AND CHILD RESTRAINT USE FOR THE BASELINE PERIOD DATA

	Child Restraint Usage	Seat Belt Usage of Passengers	Educational Attainment of Respondent	Number of Adults in Vehicle	Age of Child	Driver Relation to Child	Family Income	Vehicle Ownership
Child Restraint Usage	1.000	0.2768	0.1918	0.1216	0.0966	0.0957	0.1414	0.0824
Seat Belt Usage of Passengers	0.2768	1.000	0.2487	0.0643	0.0409	0.0511	0.1647	0.0997
Educational Attainment of Respondent	0.1918	0.2487	1.000	0.0829	0.0262	0.1121	0.4337	0.1013
Number of Adults in Vehicle	0.1216	0.0643	0.0829	1.000	0.0231	0.1172	0.1170	0.1615
Age of Child	0.0966	0.0409	0.0262	0.0231	1.000	0.0108	0.0138	0.0180
Driver Relation to Child	0.0957	0.0511	0.1121	0.1172	0.0108	1.000	0.0973	0.1361
Family Income	0.1414	0.1647	0.4337	0.1170	0.0138	0.0973	1.000	0.1508
Vehicle Ownership	0.0824	0.0997	0.1013	0.1615	0.0180	0.1361	0.1508	1.000

variables along the dependent variable, are shown (Tables B-3 and B-4). The highest correlation of the seven independent variables with CRD usage was "passengers' seat belt usage" and "educational attainment of the respondent," which confirms that these variables have the most important influence on CRD usage as was shown with univariate F values (Table B-3).

Among the predictor variables, the ones with the strongest relationship between them were family income and educational level. The variables "passenger use of seat belts" was somewhat correlated with educational attainment of the respondent and family income. Vehicle ownership was correlated to family income and the number of adult passengers in vehicle. The lowest correlations were found among age of child and family income, educational attainment of respondent and passengers' use of seat belts.

Results. The seven variables chosen for the analysis were all significant contributors to CRD usage when taken individually. Five of the seven variables were found to be significant indicators of CRD usage when the chi-square method was used. These five variables showed significance again when discriminant analysis was applied using only one variable at a time. The remaining two variables, driver relation to child and seat belt usage of passengers, were not discussed previously but showed significance at the .001 level for both periods when tested one at a time against CRD usage by the discriminant analysis procedure. Table B-2 showed the significance level for each variable tested individually in the discriminant analysis.

When taken as a set, the seven variables had an overall F ratio of 31.26 for the baseline period and 24.67 for the first operational period. Because of the reduced number of variables in the analysis, the overall F values were recalulated using the degrees of freedom associated with the original number of variables. The significance levels were not changed from being <0.001 level with the new F values. This was true using both baseline and operational data.

The seven variables used in the discriminant analysis were rank ordered in accordance with their semi-partial F values. These results are shown in Table B-5. It was found that seat belt usage by passengers other than children under four was the single most important predictor of CRD usage. Educational attainment of the respondent proved to be the next best variable.

Except for driver relation to the child (child #1) in the first operational period, all variables contributed in detecting significant differences between users and nonusers. Family income was the fifth variable to enter the analysis for both the baseline and operational data. The driver's relationship to the child was more important in detecting a difference between the group using baseline data than for operational data. The reverse was true for the variable that measured vehicle ownership.

Partial Correlation Analysis

The measurement of the strength of the relationship between the dependent variable and any independent variable with the effects of other considered

TABLE B-4

CORRELATION MATRIX FOR SEVEN INDEPENDENT VARIABLES AND CHILD RESTRAINT USE FOR THE FIRST OPERATIONAL PERIOD

	Child Restraint Usage	Seat Belt Usage of Passengers	Educational Attainment of Respondent	Number of Adults in Vehicle	Age of Child	Driver Relation to Child	Family Income	Vehicle Ownership
Child Restraint Usage	1.000	0.3077	0.2017	0.1179	0.0868	0.0808	0.1451	0.0984
Seat Belt Usage of Passengers	0.3077	1.000	0.2339	0.0595	0.0529	0.0619	0.1477	0.0676
Educational Attainment of Respondent	0.2017	0.2339	1.000	0.0329	0.0247	0.0484	0.4456	0.0506
Number of Adults in Vehicle	0.1179	0.0595	0.0329	1.000	0.0201	0.1245	0.1134	0.1928
Age of Child	0.0868	0.0529	0.0247	0.0201	1.000	0.1502	0.0108	0.0099
Driver Relation to Child	0.0808	0.0619	0.0484	0.1245	0.1502	1.000	0.0736	0.1707
Family Income	0.1451	0.1477	0.4456	0.1134	0.0108	0.0736	1.000	0.1436
Vehicle Ownership	0.0984	0.0676	0.0506	0.1928	0.0099	0.1707	0.1436	1.000

TABLE B-5

RESULTS OF DISCRIMINANT ANALYSIS

Variable	Rank Order of Importance		Semi-Partial F Ratios	
	Baseline	Operational	Baseline	Operational
Seat Belt Usage of Passengers in Vehicle with Child	1	1	141.76	120.75
Educational Attainment of Respondent	2	2	30.31	23.15
Number of Adults in Vehicle	3	3	17.31	12.39
Age of Child (Child #1)	4	4	14.12	5.99
Driver Relationship to Child (Child #1)	5	7	5.06	0.19
Family Income	6	6	2.89	1.37
Vehicle Ownership	7	5	1.41	4.07

independent variables being statistically controlled is called partial correlation analysis. The measure of this relationship is known as a partial correlation coefficient. Simple correlation (zero order) does not take into account the effects of any other variables, regardless of their relationship with the dependent variable or with one another.

Partial correlation analysis was considered to be an appropriate method to measure the relationship between CRD usage (dependent variable) and the selected independent variables since there was a great deal of uncertainty about the influence of socioeconomic variables in combination with other variables. There are numerous possibilities for analyses using partial correlation when a number of variables are available as was the case in this study. The selected variables which showed promise of contributing to the description of the variation of usage were considered for the analyses for the purposes of this study. Two other variables, "make of vehicle" and "year of vehicle" were included to demonstrate the impact of partial correlation.

Income and educational levels of adults were two socioeconomic variables which were expected to affect usage rates directly or indirectly. It is evident from the discriminant analysis that these variables were influences on CRD usage when considered separately and along with other variables.

Results. A summary of the computed partial correlations is shown for the baseline data in Table B-6. The computed correlation coefficient at zero order between passenger seat belt usage and CRD usage was .2807, but when adjusted by parcelling out the effect of income and education, the correlation coefficient was reduced to .2437. This reduction did not change the significance level; passenger seat belt usage was significant with and without the influences of education and family income.

It was anticipated that vehicle ownership would make a difference in use of CRDs. It was thought that family income would greatly influence whether or not the vehicle was owned and thereby influence usage. Partial correlations showed that for the baseline period with income eliminated, the correlation coefficient between ownership of vehicle and CRD usage was .0755 with the significance level at 0.001. The partial correlation coefficient, adjusting for income, reduced to 0.0564; adjusting for both income and education, the coefficient did not reduce much further (.0515). The significant level changed from .001 to .013 which was still highly significant.

The number of vehicles owned was another variable which was expected to be affected by family income to a great extent. The usage rates were higher for two-vehicle families but declined slightly for three-vehicle owners. Therefore, the number of vehicles were categorized into one and two or more for the analysis to make the variable linear. This variable without adjustments for income had a partial correlation coefficient of .0802; after adjusting for income the number of vehicles owned was not as important. The level of significance went from .001 to .047 (still significant).

The variable "year of vehicle" was spurious for the baseline period which means the variable explained no variation without income and education and became insignificant when their effects were eliminated. The relationship of either income or education with the variable was enough to create the spurious

TABLE B-6

SUMMARY OF RESULTS OF PARTIAL CORRELATION ANALYSIS--BASELINE PERIOD
(CRD USAGE WITH X_1 BY X_2, X_3)

X_1	Variable X_2	X_3	Correlation Coefficients (Level of Significance)			
			Zero Order	1st Order, Controlling for: Family Income	1st Order, Controlling for: Educational Attainment	2nd Order Controlling for: Family Income and Educational Attainment
Passenger Use of Seat Belts	Family Income	Educational Attainment	.2807 (.001)	.2648 (.001)	.2467 (.001)	.2437 (.001)
Vehicle Ownership	Family Income	Educational Attainment	.0755 (.001)	.0564 (.008)	.0583 (.006)	.0515 (.013)
Number of Vehicles	Family Income	Educational Attainment	.0802 (.001)	.0391 (.047)	.0550 (.009)	.0391 (.047)
Make of Vehicle	Family Income	Educational Attainment	.0625 (.004)	.0565 (.009)	.0379 (.056)	.0387 (.053)
Year of Vehicle	Family Income	Educational Attainment	.0500 (.019)	.0061 (.400)	.0116 (.315)	.0051 (.416)

correlation between year of vehicle and CRD usage. The significance level went to .40 without impact of income and to .315 without education. The combination of the two being eliminated changed the level to .416.

The partial correlations for the operational period data were much like the ones for the baseline period data (Table B-7). There were three spurious relationships--year of vehicle (as in the baseline period), number of vehicles and make of vehicle. The "make of vehicle" variable was recorded for both periods to include only two categories; all U.S.-made vehicles were in one category and all foreign manufacturers made up the second. This was done because there was higher usage among foreign-made vehicle owners than American-made vehicle owners. Educational level was the variable which caused the greatest reduction in the correlation coefficient.

An aspect of the partial correlation analysis of particular importance was level of significance changes as effects of various combinations of variables for the two periods were examined. The make of vehicle, for example, was a significant variable in influencing CRD usage when it was taken in combination with other independent variables considered during the baseline period, but it was insignificant when using the variables during the operational period. It was also insignificant when adjusted for both income and education (significance level was .053). The contrast in the analysis using the operational period data showed the variable "make of vehicle" insignificant with a .489 significance level.

The "number of vehicles owned" was a significant predictor of CRD usage for both periods when tested individually by the chi-square method. It was also significant when tested with and without the impact of income or education or a combination of the two for the baseline period; but using operational data it went from being barely significant, when adjustments were not made for income and education, to being highly insignificant when adjustments were made.

This indicates that the effects of income and education on the number of vehicles owned was enough to make the significance occur. This variable had a spurious relationship with the dependent variable using operational data. The other variable (year of vehicle) with spurious relationships during the baseline and operational period was the same; insignificant without the effects of income and education.

Profile of Users and Nonusers

Profiles of CRD users and nonusers were made to better distinguish between the groups. A profile is intended to show the most outstanding characteristics of a group with regard to a particular criterion. The characteristics of users and nonusers of CRDs were selected, and the importance of their effect on CRD usage was examined. All the characteristics are linear with respect to CRD usage and, therefore, a determination was made as to which end of the line a subject should be placed. Table B-8 shows the profiles of CRD users and nonusers for the variables considered. Variables which were analyzed by discriminant analysis, partial correlation or both and found to be contributors to CRD usage were used.

TABLE B-7

SUMMARY OF RESULTS OF PARTIAL CORRELATION ANALYSIS--FIRST OPERATIONAL PERIOD
(CRD USAGE WITH X_1 BY X_2, X_3)

	Variable		Correlation Coefficients (Level of Significance)			
				1st Order, Controlling for:		2nd Order Controlling for:
X_1	X_2	X_3	Zero Order	Family Income	Educational Attainment	Family Income and Educational Attainment
Passenger Use of Seat Belts	Family Income	Educational Attainment	.2964 (.001)	.2814 (.001)	.2631 (.001)	.2607 (.001)
Vehicle Ownership	Family Income	Educational Attainment	.0996 (.001)	.0829 (.001)	.0916 (.001)	.0859 (.001)
Number of Vehicles	Family Income	Educational Attainment	.0707 (.008)	.0300 (.152)	.0184 (.263)	.0075 (.398)
Make of Vehicle	Family Income	Educational Attainment	.0470 (.047)	.0013 (.481)	.0195 (.243)	.0040 (.444)
Year of Vehicle	Family Income	Educational Attainment	.0240 (.199)	.0175 (.269)	.0009 (.488)	.0008 (.489)

TABLE B-8

PROFILES OF USERS AND NONUSERS OF CHILD RESTRAINT DEVICES

Characteristics	Users	Nonusers
Primary:		
1. Seat Belt Use of Passengers Over 4 Years Old	Wearing Seat Belts	Does Not Wear Seat Belts
2. Educational Attainment	Higher Level	Lower Level
3. Family Income	Higher	Lower
4. Vehicle Ownership	Most Likely Yes	Less Likely Yes
5. Age of Child (Child #1)	Younger Children	Older Children
6. Driver Relation to Child (Child #1)	Most Likely Parent	Less Likely Parent
7. Number of Adults in Vehicle	Fewer	More
Secondary:		
1. Employment Status of Respondent	Employed or Homemaker	Student, Retired, Unemployed, Other
2. Marital Status	Most Likely Married/ Living with a Mate	Less Likely Married/ Living with a Mate
3. Number of Vehicles Owned	Most Likely More Than 1	Most Likely 1
4. Year of Vehicle (Spurious)	Owner of Newer Vehicle	Owner of Older Vehicle

The variables were categorized into primary and secondary characteristics according to their impact on CRD usage. A variable which affected usage both when measured individually and after the effects of family income and education attainment were removed was placed in the primary characteristics category. If the variable was important by itself but lost importance after the second order partial correlation, it became a secondary characteristic. Those variables not used in the partial correlation analysis but which remained significant for both periods after discriminant analyses were categorized as primary characteristics.

Prediction of Child Restraint Device Usage by Characteristics of Respondent

The use of seat belts by passengers has been the one variable which has stood out among the others as being the best predictor of CRD usage. It has been proven also that the relationship between a driver's decision to use seat belts and a decision to use CRDs was significant. There are variables which affect the relationship between CRD usage and seat belt usage as was evidenced from partial correlation of CRD usage and passenger seat belt use with family income and educational attainment as control variables.

Another way to investigate the relationship between CRD usage and seat belt usage is by performing crosstabulations of the two variables with a third variable. An illustrative example of the results of crosstabulation of CRD usage by seat belt usage of drivers with small children by educational attainment level of the respondent may be shown in Figure B-1.

The "seat belt usage by driver" variable was dichotomous as was CRD usage. The third variable, "educational attainment of respondent," was categorized into three groupings of (1) less than high school, (2) high school diploma but no college degree and (3) college degree or degrees. As expected, the nonuser of seat belts with the lowest level of educational attainment had the lowest CRD usage rate. The other extreme revealed the opposite; a safety belt user with the highest level of education had the highest CRD usage rate. The range went from 4.1 percent to 69.2 percent. The category of seat belt user with less than high school education had limited responses, but with those few the percentage of usage fell in line with the others.

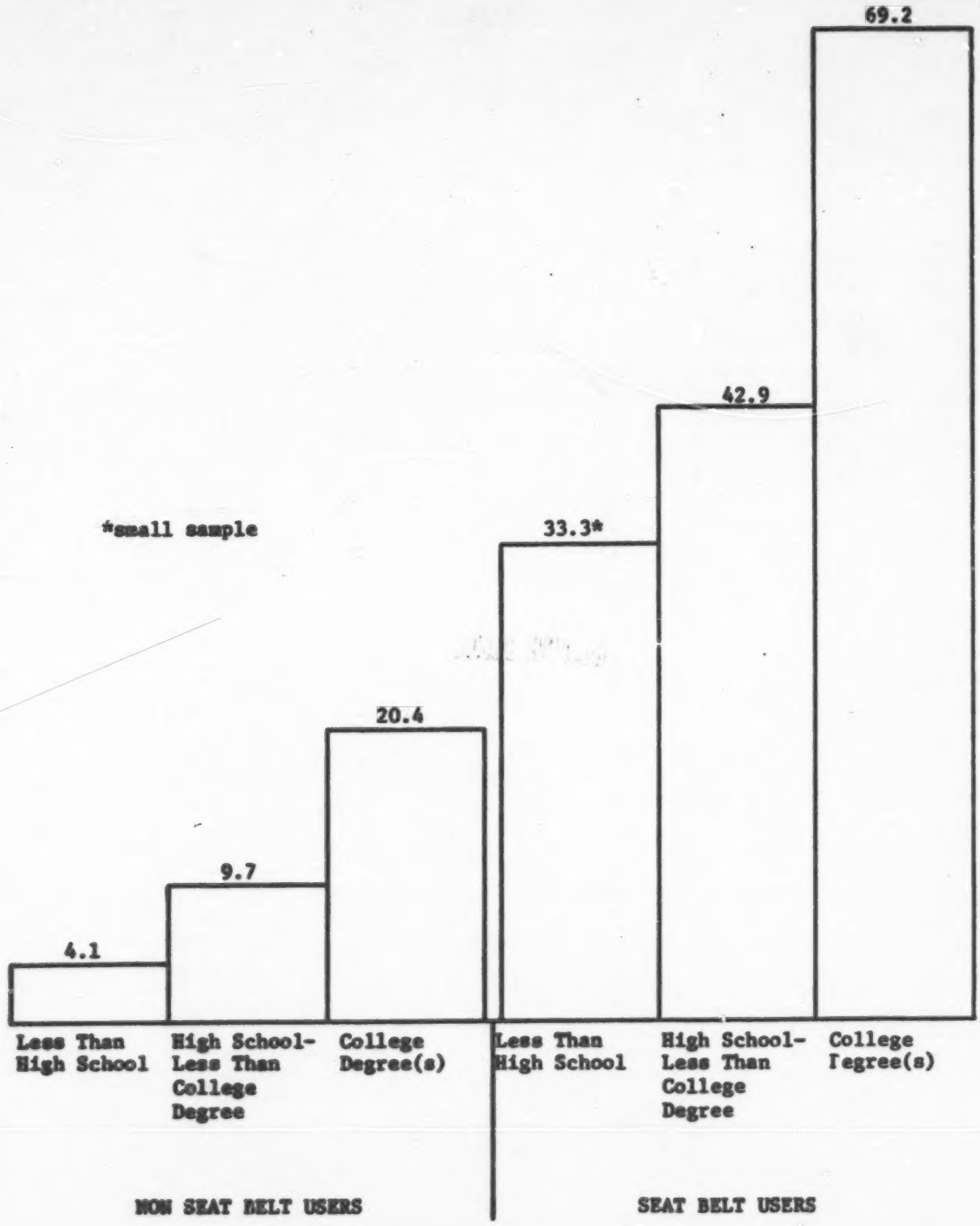

FIGURE B-1

PREDICTION OF CRD USAGE BY SEAT BELT USAGE AND EDUCATIONAL ATTAINMENT (FIRST OPERATIONAL DATA)

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APPENDIX C

ANALYSIS OF MOTOR VEHICLE ACCIDENTS INVOLVING CHILD PASSENGERS

One important measure of the effectiveness of highway safety programs is how much the rate of deaths and serious injuries has been reduced over a period of time. For the short-term evaluation of the CPS Program, an analysis of accidents involving children under four years of age was made.

The analysis of accidents involving injuries of one kind or another was performed by examining the data in six-month increments. The reason for using this time movement was to be able to compare like periods of time, i.e. January-June for each year for which data were researched.

The data on nonfatal injury accidents were furnished by the Tennessee Department of Safety. Fatal accident injury data also were furnished by the Tennessee Safety Department via the Tennessee Governor's Highway Safety Program which has the responsibility of reporting highway accident fatalities to the National Highway Traffic Safety Administration.

Summaries of fatalities and injuries to children under age four are shown in Tables C-1 through C-4. An examination of the number of injury accidents in each category for each half-year revealed no significant changes. More accidents occur during the summer months when the amount of travel is increased. The large difference between 1976-2 and 1977-1 is partially accounted for by this factor. When comparing the first half of each calendar year, only small differences occur. This, of course, was expected for fatalities since the number of deaths were low.

A possibility existed that the number of minor injuries could have increased substantially because of the so-called "babes-in-arms" amendment to the law which allows older passengers to hold children under age four. Children who often rode in a safer position in the back seat could have been relocated to the lap of an older passenger in the less safe position of the front seat. The data indicate that the percentage of children being held by older passengers did not increase, and there was no evidence of more minor injuries as was reflected by the accident data. The number of minor and major injuries were set up from the same period in 1977 but in line with the 1976 results. No inference is made that any increase was due to the change in riding positions of children in vehicles.

It was hoped that a reduction in the number of serious injuries to small children might occur due to an overall increase in CRD usage. The number of serious injuries to children under age four has remained steady over the last four years when comparing the first half-year data. Tables C-1 and C-3 reflect the total number of serious injuries and the number by age for the years 1975-1978. There is little difference between the number of serious injuries for those years.

A further investigation was made of the number of accidents in an attempt to understand better why increased CRD usage has no obvious effect on the number of injuries. The percentages of injury accidents to children under age

TABLE C-1

ACCIDENT INJURIES TO CHILD PASSENGERS UNDER AGE 4
BY SIX-MONTH PERIODS (1975-1978)

Year	Injury Severity[a]		
	Minor	Major	Fatal
1975-1	331	94	7
1975-2	369	88	10
1976-1	390	78	8
1976-2	448	128	5
1977-1	360	60	7
1977-2	462	81	9
1978-1	396	77	6

[a]Minor injuries are defined as pain and/or bruises
[a]Major injuries are defined as major bleeding

Note: Data on injuries to children under 1 year of age were unknown. It was estimated that injuries for this category were approximately the same as the 1 year old category. All unknown data were proportionately distributed to all categories.

Source: Tennessee Department of Safety Data Files

TABLE C-2

FATAL INJURIES TO CHILD PASSENGERS UNDER AGE 4 BY CALENDAR SIX-MONTH PERIODS AND AGE (1975-1978)

Year	Fatalities By Age				Total
	Under 1*	1	2	3	
1975-1	2	2	2	1	7
1975-2	3	3	1	5	10
1976-1	1	1	1	2	8
1976-2	1	1	0	2	5
1977-1	1	1	3	1	7
1977-2	2	2	2	1	9
1978-1	2	2	0	1	6

*Data on injuries to children under 1 year of age were unknown. It was estimated that injuries for this category were approximately the same as the 1 year old category. All unknown data were proportionately distributed to all categories.

Source: Tennessee Governor's Highway Safety Office Report to the National Center for Statistics and Analysis, National Highway Traffic Safety Administration, U.S. Department of Transportation.

TABLE C-3

SERIOUS NONFATAL INJURIES TO CHILD PASSENGERS UNDER AGE 4 BY SIX-MONTH PERIODS BY AGE (1975-1978)[a]

Year	Age of Child				Total
	Under 1[b]	1	2	3	
1975-1	17	17	27	33	94
1975-2	15	15	32	26	88
1976-1	12	12	28	26	78
1976-2	21	21	42	44	128
1977-1	11	11	25	23	60
1977-2	15	15	28	23	81
1978-1	17	17	18	25	77

[a]Serious injuries are defined as those reported as major bleeding.

[b]Data on injuries to children under 1 year of age were unknown. It was estimated that injuries for this category were approximately the same as the 1 year old category. All unknown data were distributed proportionately to all the categories.

Source: Tennessee Department of Safety Data Files

TABLE C-4

MINOR INJURIES TO CHILD PASSENGERS UNDER AGE 4
BY SIX-MONTH PERIODS BY AGE (1975-1978)[a]

Year	Age of Child				Total
	Under 1[b]	1	2	3	
1975-1	67	67	106	91	331
1975-2	69	69	126	105	369
1976-1	68	68	130	124	390
1976-2	106	106	114	122	448
1977-1	69	69	106	116	360
1977-2	84	84	157	137	462
1978-1	101	101	63	107	372

[a]Minor injuries are defined as those reported as pain and/or bruises.

[b]Data on injuries to children under 1 year of age were unknown. It was estimated that injuries for this category were approximately the same as the 1 year old category. All unknown data were distributed proportionately to all categories.

Source: Tennessee Department of Safety Data Files

four of all injury accidents (including fatal injuries) were calculated for each of the years used in the study. These percentages were tabulated for comparative purposes (Table C-5). The proportion of minor and major injuries to all injuries to children under age four was calculated also (Table C-5). Only a small percentage (approximately six percent) of all injury accidents involve children under four years of age, and of this small percent only about 15 percent are injured seriously (Table C-5). Therefore the number of major injuries is relatively small; 60 and 77 respectively for the first half-years of 1977 and 1978. With CRD usage low and the number of deaths and serious injuries relatively low, the chances of preventing a serious injury is small, and the chances of preventing a fatality is even smaller. There was one less fatality for the first six months of 1978 than for the same period in 1977, and there were newspaper reports of children being safe in CRDs in accidents in 1978, but there is insufficient evidence to prove any significant change.

TABLE C-5

PROPORTIONS OF ACCIDENT INJURIES TO CHILDREN UNDER AGE FOUR

Year	Percentage of Injuries to Children Under Age Four of All Accident Injuries	Percentage of Major Nonfatal Injuries of Total Injuries to Children Under Age Four	Percentage of Minor Injuries of Total Injuries to Children Under Age Four
1975-1		21.8	76.6
1975-2	5.4[a]	18.8	79.0
1976-1		16.4	81.9
1976-2	5.2[a]	22.0	77.1
1977-1		14.1	84.3
1977-2	5.7[a]	14.7	83.7
1978-1	5.7	16.1	82.7

[a]Percentage for entire year